

SUB-ORDER APODES.

FAMILY ANGUILLIDÆ.

ANGUILLA.

Shaw, Gen. Zool., iv, p. 15 (1804) ; Günth., Cat. Fish., viii, p. 23 (1870) ; Bouleng., Fish. Nile, p. 401 (1907), and Cat. Freshw. Fish. Afr., iii, p. 3 (1915).

“ Body much elongate, serpentiform, with minute scales imbedded in the skin, arranged in small groups placed obliquely at right angles to one another. Pectoral fins well developed ; dorsal and anal fins very long, united at the end of the tail, the former originating at a great distance from the occiput. Mouth large, with more or less developed lips ; jaws and palate with bands of small pointed teeth ;

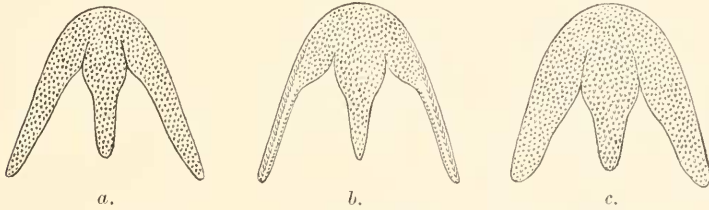


FIG. 111.—Dentition of upper jaw and palate in adult specimens of : (a) *A. mossambica* ; (b) *A. bengalensis* ; (c) *A. australis*. The bands of teeth are narrower in young specimens.

nostrils widely separated from each other, the anterior tubular and at the tip of the snout, the posterior slit-like and close to the eye. Gill-openings small, crescentic, close to the base of the pectoral fins.

Breed in the deep sea, where they undergo very marked metamorphoses (larval forms known as *Leptocephalus*). In Africa, confined to the rivers flowing into the Mediterranean and the North Atlantic and Indian Oceans.” *Blgr.*

Occasional specimens, of a large size, have been reported from the mouth of the Orange River.

Synopsis of the Species.

1. Dorsal originating well in advance of vent.

Mouth extending beyond eye ; teeth on sides of jaw in

3 (young) to 6 series, not separated by a longi-

tudinal groove or interspace *A. mossambica*, Peters.

- Mouth extending to below posterior border of eye or beyond; teeth on sides of jaw in 2 series, separated by a longitudinal groove or interspace (young), or in a single or double series with an inner detached series of minute, sometimes very indistinct teeth . . . *A. bengalensis*, Gray.
2. Dorsal originating above or slightly in advance of vent; teeth on sides of jaw in 4 (young) to 10 series *A. australis*, Rich.

I. ANGUILLA MOSSAMBICA, Peters.

Tribranchus anguillararis, Peters, in J. Müll. Abhand. Ak. Berl., 1844, p. 193.

Muraena (Anguilla) mossambica, Peters, Mon. Berl. Ac., 1852, p. 684.

Anguilla celebesensis, Kaup, Cat. Apod. Fish., p. 42 (1856); M. Web., Zool. Jahrb., Suppl. xv, i, 1912, p. 585, figs.

Anguilla delalandii, Kaup, t.c., p. 50, pl. viii, fig. 41 (1856); Bleek. Visch. v. d. Kaap, p. 56, name only (1860); Günth., Cat. Fish., viii, p. 33 (1870); Sauvage, Hist. Madagascar, Poiss., p. 498, pl. 1, fig. 6 (1891); Gilchr., Cat. Fish. Mar. Inv. S. Afr., i, 1902, p. 154.

Anguilla capensis, Kaup, Abb. Nat. Ver. Hamb., iv, 2, 1859, p. 18, pl. ii, fig. 2; Cast. Mem. Poiss. Afr. Austr., p. 73 (1861).

Anguilla labiata (part.), Playf. and Günth., Fish. Zanzibar, p. 124, fig. (1866).

Anguilla mossambica, Peters, Reise Mossamb., iv, p. 98, pl. xviii, fig. I (1868); Günth., t.c., p. 28 (1870); M. Web., t.c., p. 590 (1912); Bouleng., Freshw. Fish. Afr., iii, p. 6 (1915).

Anguilla aeneitensis, Günth., t.c., p. 34 (1870); M. Web., Fische Aru- und Kei-Ins., p. 22 (1911).

Anguilla virescens (part.), Günth., t.c., p. 35 (1870).

Anguilla megastoma, Kaup, Cat. Apod. Fish., p. 30 (1856); Jord. and Seale, Fish. Samoa, p. 192 (1906).

Teeth in moderately broad bands of four to six series, tapering posteriorly; vomerine teeth in a similar band narrowing posteriorly. Mouth extending to below or a little beyond posterior border of eye; lower jaw projecting. Distance from end of snout to gill-opening $2\frac{3}{5}$ to $2\frac{4}{5}$ times in distance from end of snout to vent. Tail much longer than body. Origin of dorsal much in advance of vent, nearly midway between pectoral and vent or slightly nearer the latter. Pectoral $2\frac{1}{2}$ to $2\frac{3}{4}$ times in its distance from end of snout.

Colour (of preserved specimens) olive green or brown above, yellowish or whitish beneath.

One specimen, 473 mm. in length from M'fongosi, Zululand (W. E. Jones.)

Two specimens, 408 mm., 426 mm. in length respectively, from Manzemtonto River, Transvaal (Major J. Stevenson Hamilton).

Two specimens, 276 mm., 340 mm. in length respectively, from Isipingo, Natal (Freshwater).

The species is also reported from the Indian and South Pacific Oceans, and as entering the rivers of East and South Africa.

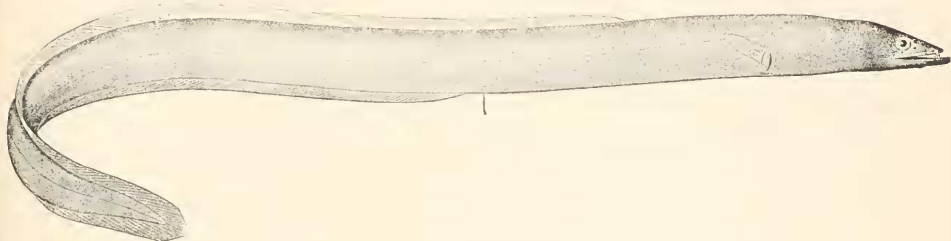


FIG. 112.—*Anguilla mossambica*. Type, after Peters (Reise Mossamb.). $\frac{1}{2}$.

2. ANGUILLA BENGALENSIS, Gray.

Muraena bengalensis, Gray in Hardw. Ill. Indian Zool., pl. —, fig. 5 (1830).

Anguilla mauritiana, Benn., Proc. Comm. Zool. Soc., 1831, p. 128; Günth., Cat. Fish., viii, p. 25 (1870); Shore Fishes, *Challenger*, p. 58 (1880); and Fische Süd-see, p. 389 (1910); Jord and Everm., Fish. Formosa, in Proc. U.S. Nat. Mus., xxv, 1903, p. 325; M. Web., Zool. Jahrb., Supp. xv, i, 1912, p. 582, fig.

Anguilla elphinstouei, Sykes, Trans. Zool. Soc., ii, 1841, p. 337; M. Web., t.c., p. 578.

Muraena (Anguilla) labiata, Peters, Mon. Berl. Ac., 1852, p. 684.

Muraena (Anguilla) macrophthalma, Peters, l.c.

Anguilla johannae, Playf. and Günth., Fish. Zanzibar, p. 124, fig. (1866).

Anguilla labiata (part.), Playf. and Günth., l.c.

Anguilla labiata, Peters, Wieg. Arch., 1855, p. 270, and Reise Mossamb., iv, p. 94, pl. xvii (1868); Günth., Cat. Fish., viii, p. 26 (1870); Vincig. Ann. Mus. Genova (2), xv, 1895, p. 27; Pfeffer, Ost-Afr. Fische, p. 41 (1893), and Thierw. O.-Afr., Fische, p. 71 (1896); Gilchr., Cat. Fish. Mar. Inv. S. Afr., i, 1902, p. 155.

Anguilla macrophthalma, Peters, l.c., p. 99, pl. xix; Günth., t.c., p. 28 (1870).

Anguilla bengalensis, Günth., t.c., p. 27 (1870), and Proc. Zool. Soc., 1904, p. 91; Bouleng., Proc. Zool. Soc., 1902, ii, p. 224, and Freshw. Fish. Afr., iii, p. 7, fig. 5 (1915).

? *Anguilla hildebrandti*, Sauvage, Hist. Madagascar, Poiss., p. 499, pl. xlix a, fig. 1 (1891).

Maxillary and mandibulary teeth in bands tapering on the sides to a single or double series on the outer side separated by an interspace

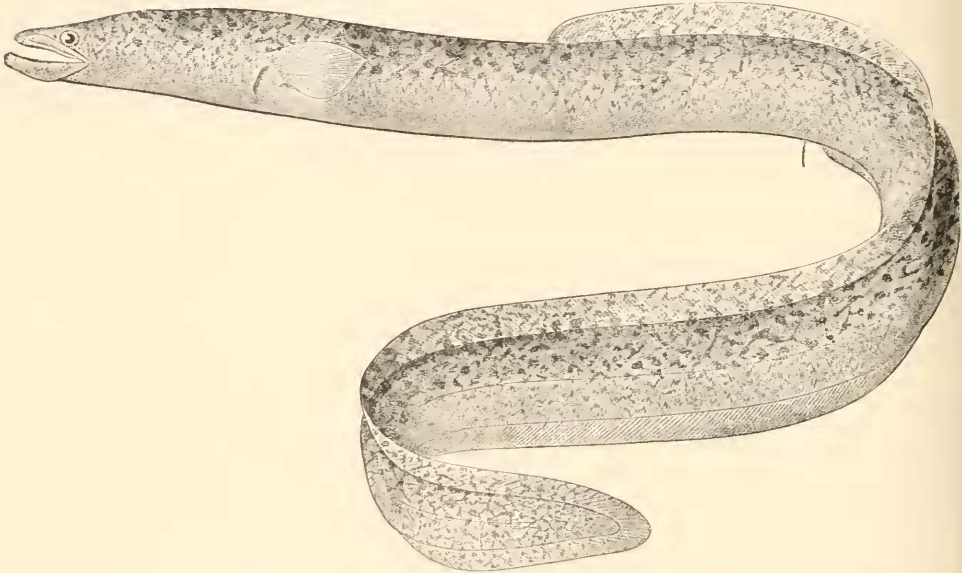


FIG. 113.—*Anguilla bengalensis*. Zambesi (type of *A. labiata*, after Peters (Reise Mossamb.)). $\frac{1}{2}$.

from an inner series of small teeth; vomerine patch of teeth tapering to a narrow band. Mouth extending to beyond posterior border of eye; lower jaw projecting. Distance from end of snout to gill-opening $2\frac{3}{4}$ to $3\frac{1}{2}$ times distance from end of snout to vent. Tail much longer than body. Origin of dorsal midway between pectoral and vent, or a little nearer to the former. Pectoral $2\frac{1}{2}$ to $3\frac{1}{10}$ times in its distance from end of snout.

Colour (of preserved specimens), reddish brown.

One specimen, 463 mm. in length, from Orange River (Dr. D. R. Kannemeyer).

One specimen, 392 mm. in length, from M'fongosi, Zululand (W. E. Jones).

It is also reported from the Indian and South Pacific Oceans, entering rivers of East and South Africa.

3. **ANGUILLA AUSTRALIS*, Richards.

Anguilla australis, Richards., Proc. Zool. Soc., 1841, p. 22, and Trans. Zool. Soc., iii, 1843, p. 157; M. Weber, Zool. Jahrb., Suppl. xv, i, 1912, p. 593; Bouleng., Freshw. Fish. Africa, iii, p. 9, fig. 6 (1915).

Anguilla bicolor, McClell., Calcutta Journ. N. H., 1845, p. 178, pl. vi, fig. 1; Günth., Cat. Fish., viii, p. 35 (1870).

Muraena macrocephala, Rapp, Jahresh. Ver. Nat. Württemb., iv, 1849, p. 142, pl. ii.

Muraena (Anguilla) virescens, Peters, Mon. Berl. Ac., 1852, p. 684.

Anguilla amblodon, Playf. and Günth., Fish. Zanzibar, p. 125, fig., 1886; Günth., t.c., p. 37.

Anguilla virescens, Peters, Reise Mossamb., iv, p. 101, pl. xxiii, fig. 2 (1868); Pfeffer, Thierw. O.-Afr., Fische, p. 71 (1896); Günth., Fische Süd-see, p. 392 (1910).

Anguilla virescens (part.), Günth., t.c., p. 35.

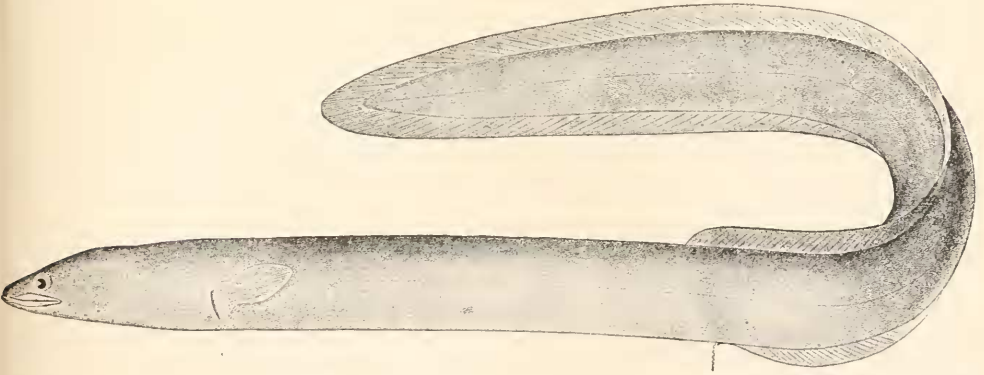


FIG. 114.—*Anguilla australis*. Licuare R. (type of *A. virescens*), after Peters (Reise Mossamb.). $\frac{1}{2}$.

“Teeth forming broad bands, in 4 to 10 series, on the sides of the upper and lower jaws.* Mouth extending to below posterior border of eye or beyond; lower jaw projecting. Distance from end of snout

* In this, as in other species, the bands of teeth are wider in the adult than in the young, the great width of these bands in the type of *A. amblodon* being due to its large size (1070 millim.).

to gill-opening 3 to $3\frac{1}{2}$ times in distance from end of snout to vent. Tail longer than body. Origin of dorsal above or slightly in advance of vent. Pectoral $2\frac{1}{2}$ to 4 times in distance from end of snout. Olive or dark green above, yellowish or white beneath. Vertebrae 105-109.

Total length over 1 metre.

Indian and South Pacific Oceans; entering rivers of East Africa and Natal."

SUB-ORDER HAPLOMI.

FAMILY GALAXIIDAE.

"The *Galaxiidae* present many analogies to the *Salmonidae* of the Northern Hemisphere, both being circumpolar groups of marine origin which are establishing themselves in fresh-water. In both families we meet with non-migratory forms which appear to have finally left the sea, and with others which return to the sea periodically; but whilst the migratory *Salmonidae* are anadromous (ascending rivers to spawn), the migratory *Galaxiidae*, on the contrary, are catadromous (going down to the sea to spawn). . . . The burrowing-habits of a species of *Galaxias* have been recorded by T. S. Hall (Vict. Nat., xviii, 1900, p. 65), who states that, according to the observations of Mr. Russell Ritchie of Launceston, in Tasmania, *Galaxias* have been dug up in moist peaty soil, and swim when placed in water. As many as twelve at a time have been dug up in one place and lived in water in a pickle jar for various periods up to three days." (Regan; Proc. Zool. Soc., 1905, vol. ii, p. 364.)

GALAXIAS.

Galaxias, Cuv., Règne Anim., ii, p. 183 (1817); Cuv. and Val., Hist. Nat. Poiss., xviii, p. 340 (1846); Gunth., Cat. Fish., vi, p. 208 (1866); Regan, Proc. Zool. Soc., 1905, ii, p. 365, and Trans. Roy. Soc. Edinb., xlix, pt. ii (No. 2), 1913, pp. 290, 291; Bouleng., Cat. Freshw. Fish. Afr., iii (1915), p. 12.

Mesites (non Geoff.), Jenyns, Voy. *Beagle*, Fish., p. 118 (1842).

Austrocobitis, Ogilby, Proc. Linn. Soc. N.S. Wales, xxiv, 1899 p. 158.

1. GALAXIAS ZEBRATUS, Cast.

Cobitis zebtratus, Cast., Mém. Poiss. Afr. Austr., p. 56 (1861).

Galaxias capeusis, Steindr., Sitz. Ak. Wien, ciii, i, 1894, p. 460, pl. iii, fig. 2; M. Web., Zool. Jahrb., Syst. x, 1897, p. 154.

Galaxias zebtratus, Bouleng., Ann. and Mag. Nat. Hist. (7), xvi, 1905, p. 51, and Freshw. Fish. Afr., iii, p. 12, fig. 8 (1915); Regan, Proc. Zool. Soc., 1905, ii, p. 367.

Teeth small, subequal. Depth of body $5\frac{1}{6}$ to $6\frac{2}{3}$ times in total length excluding caudal, length of head $3\frac{3}{5}$ to 4 times. Snout rounded, as long as or a little shorter than eye, which is $3\frac{1}{2}$ to 4 times in length of head; jaws about equal in front, chin feebly projecting; mouth extending to below anterior border or anterior fourth of eye. Gill-rakers short, 8 on lower part of anterior arch.

Dorsal iii-iv 7-8; originating at nearly equal distance from occiput and from base of caudal. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head or distance



FIG. 115.—*Galaxias zebtratus*.

from its base to ventral. Ventral 6-rayed, equally distant from end of snout and from base of caudal. Anal iii-iv 7-8, originating below middle or anterior half of dorsal. Caudal rounded-subtruncate, continued anteriorly on caudal peduncle, which is twice or nearly twice as long as deep.

Colour (of preserved specimens) greyish or brownish, minutely speckled with dark specks, uniform or with numerous faint cross-bars on back and sides.

Several specimens, ranging from 19-31 mm. in length, from Somerset West, Cape Province.

Three specimens, ranging from 20-31 mm. in length, from Willem's River, Calvinia, Cape Province (Revd. C. L. Leipoldt).

Three specimens, ranging from 22-24 mm. in length, from George River (?), Cape Province.

2. GALAXIAS PUNCTIFER, Cast.

Cobitis punctifer, Casteln., Mém. Poiss. Afr. Austr. p. 56, (1861).

Galaxias punctifer, Bouleng., Ann. and Mag. Nat. Hist. (7), xvi, 1905, p. 51, and Freshw. Fish. Afr., iii, p. 13 (1915); Regan, Proc. Zool. Soc., 1905, ii, p. 367, pl. x, fig. 3.

Teeth small, subequal. Depth of body 5 to 6 times in total length excluding caudal, length of head $3\frac{1}{2}$ to $4\frac{1}{2}$ times. Snout rounded, as long as or a little shorter than eye, which is $3\frac{2}{3}$ to 4 times in length of head; interorbital width about 3 to $3\frac{1}{2}$ times in length of head; jaws equal in front, mouth extending to below anterior fourth or anterior third of eye. Gill-rakers short, 8 on lower part of anterior arch.

Dorsal iii-iv 7-8, originating at equal or nearly equal distance, from occiput and from base of caudal. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head or of the distance from its base to ventral. Ventral 6-rayed, equally distant from snout and from base of caudal. Anal iii-iv 8, commencing below middle or posterior half of dorsal. Caudal truncate, slightly emarginate; continued anteriorly on caudal peduncle, which is $2\frac{1}{2}$ to $2\frac{3}{4}$ times as long as deep.



FIG. 116.—*Galaxias punctifer*.

Colour (of preserved specimens) pale brown or yellowish, darker above than below, uniform, or with faint bars on back; body freely speckled with minute dark specks.

Four specimens, ranging from 28-57 mm. in length, from the Flats, Cape Peninsula.

Four specimens, ranging from 23-33 mm. in length, from Diep River, Cape Peninsula.

Many specimens, ranging from 17-24 mm. in length, from Lakeside, Cape Peninsula (B. Power).

Galaxias punctifer is barely distinguishable from the preceding (*G. zebratus*) by "the rather more slender habit, the caudal peduncle being $2\frac{1}{2}$ times as long as deep, and the shape of the caudal fin, which is truncate and slightly emarginate. The dark bars on the body are absent or confined to the back." (Bouleng., Freshw. Fish. Afr., iii, p. 13).

3. GALAXIAS DUBIUS, n. sp.

Teeth rounded, subequal. Depth of body $6\frac{2}{5}$ to 7 times in total length excluding caudal, length of head 4 to 5 times. Snout rounded,

a little shorter than eye, which is $3\frac{2}{3}$ to a little more than 4 times in length of head; interorbital width $2\frac{3}{4}$ to $2\frac{1}{2}$ times in length of head; jaws equal in front; mouth extending to below anterior margin or anterior fourth of eye. Gill-rakers short, 8 on lower part of anterior arch.

Dorsal iii-iv 8-9; originating well behind middle of body, about $1\frac{1}{5}$ to $1\frac{1}{3}$ times as distant from occiput as from base of caudal. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head or of the distance from its base to ventral. Ventral 6-rayed, about equally distant from end of snout and base of caudal. Anal iv 8-9, originating below anterior third of dorsal. Caudal rounded sub-truncate, continued anteriorly on caudal peduncle, which is nearly twice as long as deep.

Colour (of preserved specimens) brownish, minutely speckled with dark specks and with faint dark bars on back and sides.

Many specimens, ranging from 23-42 mm. in length, from George River, Cape Province.

This little fish closely resembles *G. zebratus*, but the dorsal fin is placed decidedly further back, and the anal rays are more in number. It is not improbable that the three species described may on examination of more extensive collections prove to be merely varieties of one species.

SUB-ORDER SCOMBRESOCES.

FAMILY CYPRINODONTIDAE.

HAPLOCHILUS.

Haplochilus, McClell., *Asiat. Res.*, xix, 1839, pp. 301 and 426; Günth., *Cat. Fish.*, v, p. 310 (1866); Bouleng., *Poiss. Bass. Congo*, p. 344 (1901), *Fish. Nile*, p. 415 (1907), and *Freshw. Fish. Africa*, iii, p. 40 (1915).

Epiplatys, Gill, *Proc. Acad. Philad.*, 1862, p. 136.

Atopocheilichthys, Bleeker, *Nat. Verb. Vet. Haarlem*, xviii, 1863, no. 2, p. 116.

Lycocypyrinus, Peters, *Mon. Berl. Ac.*, 1868, p. 146.

Mouth small; teeth conical, in a narrow band, those of the outer series largest. Head usually flat above. Scales moderate. Dorsal fin commencing well behind origin of anal. Ventral fins present, far behind base of the pectorals.

"Fresh and brackish waters of Africa, Southern and Eastern Asia, Central and South America, and the West Indies."

1. * HAPLOCHILUS MYAPOSÆ, Blgr.

Bouleng., Ann. Nat. Mus., i, 1908, pt. 3, p. 232, and Freshw. Fish. Africa, iii, p. 44, fig. 31 (1915).

“Depth of body 4 to $4\frac{1}{2}$ times in total length, length of head $3\frac{2}{3}$ to 4 times. Head flat above; snout short and broad, shorter than eye; mouth directed upwards, lower jaw projecting; eye nearly 3 times in length of head, $1\frac{1}{2}$ times in interorbital width, as long as or a little shorter than postorbital part of head; preorbital hardly $\frac{1}{3}$ diameter of eye.

Dorsal 10, originating twice as far from anterior border of eye as from root of caudal, above anterior third of anal, median rays longest, about $\frac{1}{2}$ length of head. Anal 14-15, rounded like the dorsal. Pectoral $\frac{3}{4}$ length of head, reaching a little beyond base of ventral; latter nearer end of snout than root of caudal. Caudal rounded, as long

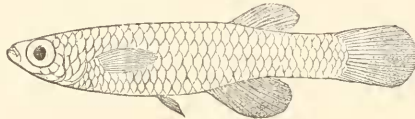


FIG. 117.—*Haplochilus myaposa*. Type (Ann. Natal Mus. 1908).

as head. Caudal peduncle $1\frac{1}{3}$ times as long as deep. 27-28 scales in longitudinal series, 16 round body in front ventrals; no lateral-line pits. Pale olive, with darker edges to the scales; fins greyish.

Total length 28 millim.

Zululand.—Types in Natal Museum, Pietermaritzburg.”

From Myaposa River (Dr. E. Warren).

2. HAPLOCHILUS JOHNSTONII, Günth.

Haplochilus johnstonii, Günth., Proc. Zool. Soc., 1893, p. 627; Bouleng., Ann. Natal Mus., i, 1908, p. 220, and Freshw. Fish. Africa, iii, p. 69, fig. 56 (1915).

Haplochilus atripinna, Pfeff., Thierw. O.-Afr., Fische, p. 46 (1896); Hilgendorf and Pappenheim, Sitzb. Ges. naturf. Fr., 1903, p. 271.

Teeth, outer row enlarged and recurved. Depth of body $4\frac{1}{2}$ to $4\frac{7}{10}$ in total length, excluding caudal, length of head $3\frac{9}{10}$ to $4\frac{1}{8}$ times. Head flat above; snout short and broad, shorter than eye; mouth directed upwards, lower jaw projecting; eye $2\frac{1}{2}$ to $2\frac{2}{5}$ times in length of head, a little shorter than postorbital part of head, $1\frac{1}{10}$ to $1\frac{1}{3}$ times in interorbital width; preorbital nearly $\frac{1}{2}$ diameter of eye.

Dorsal 8, originating twice as far from eye as from root of caudal, above posterior third of anal; last rays longest, $\frac{3}{5}$ length of head. Pectoral $\frac{7}{10}$ length of head, reaching base of ventral; the latter moderately large, reaching anal, and much nearer to end of snout than to root of caudal. Anal 14. Caudal rounded, about as long as or slightly longer than length of head; caudal peduncle about $1\frac{3}{4}$ times as long as deep. 28-30 scales in longitudinal series, 18 round body in front of ventrals; no lateral-line pits.

Colour (of preserved specimens), light brown above, pale yellowish beneath, finely speckled with darker, especially on the borders of the scales; a fine blackish line runs along the sides of the body from the opercular border to the base of caudal; fins greyish.

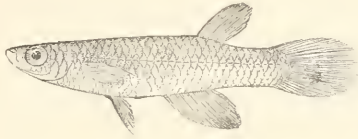


FIG. 118.—*Haplochilus johstonii*. Type.

Two specimens, 29 mm., 33 mm. in length respectively, from Sakania, South Congo (Rev. T. A. Rogers). Bulawayo Museum

The species is also reported from Nyassaland, Lake Rukwa, and Zululand.

SUB-ORDER ACANTHOPTERYGII.

DIVISION PERCIFORMES.

FAMILY CICHLIDAE.

The African Cichlidae are computed by Dr. Boulenger ('Catalogue of the Freshwater Fishes of Africa,' vol. iii, 1915) to number 285 well-established species, grouped under 41 genera; he remarks, however (p. 134), that "the classification of the very numerous African members of this family presents the greatest difficulties . . . the dentition in certain species being subject to variation, according to age, or even of a purely individual nature." Lake Tanganyika has furnished about one-third of these species, and is remarkable for the very numerous generic types with very aberrant dentition which appear to have been evolved out of the more generalised forms occurring in the rivers of Africa.

Some members of this large family, *e.g.* *Tilapia*, *Tropheus*, and

Ectodus, are of considerable interest owing to their mode of spawning and the nursing habits of the parent fish. In the *Tilapia*, for instance, it has been observed that in some species the ova are deposited in a small hollow or nest made in the bed of a pond or stream, and after fertilisation by the male—who is very determined in attacking and driving off any strange fish—are taken into the mouth of the female and carried in the buccal cavity until hatched. Mr. Schoeller, in some observations made at Alexandria (Egypt), noticed that the young fry after hatching took refuge in the mother's mouth immediately any alarm or danger appeared.

Formerly these nursing duties were believed to devolve upon the male, but careful examinations by Dr. Boulenger and others show that it is always the female that undertakes them, and that she apparently goes without food during the ten days or so that elapse whilst the eggs are hatching in her mouth.

Synopsis of the South African Genera described.

Dorsal and anal fins without scaly sheath at the base.

- A.** Outer teeth bi- or tricuspid, rarely conical, without canines in front, not swollen at the base.
 - Teeth forming narrow or moderately broad bands, the outer bicuspid, rarely conical; dorsal with 11-19 spines, anal with 3 or 4. *Tilapia*, A. Smith.
 - Teeth forming very broad bands, all tricuspid; dorsal with 16-20 spines, anal with 3. *Petrochromis*, Blgr.
- B.** Outer teeth bicuspid in some individuals, conical in others (forms connecting *Tilapia* and *Paratilapia*); dorsal with 13-19 spines, anal with 3-6. *Haplochromis*, Pfeff.
- C.** Outer teeth conical in the adult, sometimes bicuspid in the young, with or without curved canines.
 - Anal with 3 spines (exceptionally 4).
 - Outer teeth, if closely set, not strongly incurved.
 - Two lateral lines; ventrals with the outer rays longest.
 - Outer mandibular teeth not pointing outwards.
 - Two or more series of teeth in each jaw; no strong papillose pad in front of the gill-arches; dorsal with 10-18 spines, anal with 6-14 soft rays. *Paratilapia*, Blkr.

- A very strong papillose pad in front of the gill arches; otherwise as in *Paratilapia* . *Pelmatochromis*, Stndr.
Teeth in one or two, very rarely three series, the two median teeth of the outer series enlarged; dorsal with 13-15 spines . . . *Hemichromis*, Peters.

TILAPIA.

Chromis, part., Cuvier, Règne Anim., ii, p. 266 (1817); Günth., Cat. Fish. iv, p. 267 (1862).

Tilapia, A. Smith, Ill. Zool. S. Afr. Fish. (1849); Bouleng., Proc. Zool. Soc., 1899, p. 105, part.: Poiss. Bass. Congo, p. 452 (1901), Fish. Nile, p. 513 (1907), and Freshw. Fish. Africa, iii, p. 138 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 307.

Sarotherodon, Rüpp., Verz. Mus. Senck., iv, p. 21 (1852); Günth., t.c., p. 273.

Coptodon, Gervais, Bull. Soc. Agric. Hérault, 1853, p. 81.

Haligenes, Günth., Proc. Zool. Soc., 1859, p. 471.

Ptychochromis, Steindr., Sitzb. Ak. Wien, lxxvii, i, 1880, p. 248; Pellegr., t.c., p. 346.

Oreochromis, Günth., Proc. Zool. Soc., 1889, p. 70; Pellegr., t.c., p. 354.

Ctenochromis, part., Pfeff., Jahrb. Hamb. Wiss. Aust., x, 1893, p. 149.

Ophthalmotilapia, Pellegr., t.c., p. 345.

"Body short or more or less elongate; scales cycloid or etenoid; two incomplete lateral lines. Teeth in two or more series, the outer bicuspid,* the others tricuspoid; maxillary usually more or less completely hidden under the preorbital when the mouth is closed. Dorsal fin with 11-19 spines, anal with 3 or 4. Parietal and occipital crests strong, extending to between the orbits. Vertebrae 26-34."

Synopsis of the South African Species described.

I. Scales cycloid (rarely indistinctly etenoid).

A. Gill-rakers 15-27 on lower part of anterior arch.

Anal spines 3 (very rarely 4); pectoral usually as long as or longer than head, often reaching vertical of origin of anal or beyond.

Caudal not densely scaled.

1. Outer teeth small and slender or unicuspid.

* "Occasionally conical or indistinctly bicuspid in a few species which are related to *T. nilotica* (*T. nigra*, *mossambica*, *natalensis*, *linnelli*, *squamipinnis*) See also *Haplochromis*."

(a) Caudal peduncle as long as deep; 4 series of scales on the cheek; 25 gill-rakers.

D. xvi-xvii 13; A. iii 11; Sc. 31-

33 $\frac{4\frac{1}{2}}{16}$; caudal rounded 1. *T. kafuensis*, Blgr.

(b) Caudal peduncle as long as deep, rarely a little deeper than long; 2 or 3 series of scales on the cheek; 15-23 gill-rakers; pectoral usually not much longer than head.

D. xvi 12-13; A. iii 11; Sc. 31 $\frac{4\frac{1}{2}}{15}$;

mouth moderate, about $\frac{1}{3}$ width of head, extending to behind nostril; caudal truncate

2. *T. intermedia*, n. sp.

D. xv-xvi 10-12; A. iii (iv) 9-10;

Sc. 28-33 $\frac{3\frac{1}{2}-4\frac{1}{2}}{12-15}$; mouth large, at least about $\frac{3}{4}$ width of head, extending to below eye, or not quite so far; caudal rounded in the adult

3. *T. mossambica*, Peters.

D. xv-xvi 11-13; A. iii 10; Sc.

28-31 $\frac{3\frac{1}{2}}{12}$; mouth large, extending to anterior border of eye (or nearly so) or a little beyond; caudal truncate

4. *T. vorax*, Pfeff.

D. xv-xviii 10-12; A. iii 9-11;

Sc. 27-31 $\frac{3\frac{1}{2} \frac{4\frac{1}{2}}{13-17}$; mouth $\frac{2}{3}$ to $\frac{3}{4}$ width of head, extending to between nostril and eye; caudal truncate or slightly emarginate (angles sometimes rounded)

5. *T. natalensis*, M. Web.

(c) Caudal peduncle deeper than long; 2 or 3 series of scales on the cheek; 15-25 gill rakers; pectoral often much longer than head in adult.

D. xv-xvi 11-13; A. iii 9-10; Sc.

29-31 $\frac{3-3\frac{1}{2}}{13-15}$; caudal truncate or slightly emarginate

6. *T. macrochir*, Blgr.

D. xvii 12; A. iii 9; Sc. 28 $\frac{4}{11}$;

caudal truncate or slightly emarginate

7. *T. sheshakensis*, n. sp.

(2) Outer teeth with extremely slender shafts, sometimes almost setiform; 2 or 3 series of scales on the cheek; caudal truncate or slightly emarginate.

(a) Caudal peduncle deeper than long; 18-27 gill-rakers.

D. xv-xvii 12-14; A. iii 10-12;

Sc. 30-34 $\frac{3\frac{1}{2}-4\frac{1}{2}}{14-16}$; mouth extend-

ing to below nostril or slightly

beyond 8. *T. galilaea*, Art.

D. xv-xvii 11-13; A. iii 9-11; Sc.

29-33 $\frac{3-4}{12-16}$; mouth extending

to between nostril and eye . . . 9. *T. andersonii*, Cast.

(b) Caudal densely scaled; 15-22 gill-rakers.

D. xvi 10-11; A. iii 8-9; Sc. 32-

36 $\frac{3\frac{1}{2}}{14-16}$; 2 series of scales on

the cheek; caudal peduncle

longer than deep; caudal

rounded, with a feeble median

notch, or upper angle pointed . . . 10. *T. squamipinnis*, Günth.

B. Gill-rakers 7-15 on lower part of anterior arch.

Outer teeth moderately slender or rather large.

1. 2-5 series of scales on the cheek.

(a) 15 or 16 dorsal spines (rarely 14 or 17); 8-11 (rarely 7) anal rays.

* Depth of body not more than twice (or, rarely, slightly more) in total length; pectoral as long as head, or a little shorter or longer.

D. xiv-xvi 10-14; A. iii 9-11; Sc.

28-32 $\frac{2\frac{1}{2}-3\frac{1}{2}}{11-14}$; 8 to 12 gill-rakers

on lower part of anterior arch. 11. *T. melanopleura*, A. Dum.

D. xv 11; A. 9; Sc. 27 $\frac{1}{11}$; 15 gill-

rakers on lower part of anterior

arch 12. *T. arnoldi*, n. sp.

** Depth of body more than twice in total length. Pectoral longer than head.

D. xvi 12; A. iii 14; Sc. 30 $\frac{3\frac{1}{2}}{12}$;

8 gill-rakers; scales on cheek

in 4 rows 13. *T. swierstrae*, n. sp.

D. xvi 12; A. iii 10; Sc. 29 $\frac{3\frac{1}{2}}{12}$;

9 gill-rakers; scales on cheek

in 4-5 rows 14. *T. mackeuni*, n. sp.

D. xvi 11; A. iii 9; Sc. 30 $\frac{3\frac{1}{2}}{12}$;

9 gill-rakers; scales on cheek

in 3 rows 15. *T. sykesii*, n. sp.

- D. xvi 11; A. iii 8; Sc. $28\frac{4}{11}$;
 9 gill-rakers; scales on cheek
 in 3 rows 16. *T. druryi*, n. sp.
- (b) 14 dorsal spines; 6 soft anal rays. Depth of body more than
 3 times in total length. Caudal truncate. Pectoral shorter
 than head.
- D. xiv 10; A. iii 6; Sc. $29\frac{4}{9}$; 10 gill-
 rakers; scales on cheek in
 4 rows 17. *T. runsayi*, n. sp.
- (c) 11-15 dorsal spines; 8-11 soft anal rays. Depth of body 2 to
 3 times in total length. Caudal rounded or rounded-sub-
 truncate.
1. 2 to 4 series of scales on the cheek.
 Breast and belly scaly.
- D. xiii-xv 9-11 (very rarely 12);
 A. iii 8-10; Sc. $27-29\frac{2\frac{1}{2}-3\frac{1}{2}}{9-11}$;
 9-12 gill-rakers; 2 or 3 series
 of scales on cheek; depth of
 body $2-2\frac{3}{4}$ times in total length 18. *T. sparrmani*, A. Smith.
- D. xiii 11; A. 7; Sc. $26\frac{5}{10}$; 9 gill-
 rakers; 3-4 series of scales on
 the cheek; depth of body a
 little more than $2\frac{1}{2}$ times in
 total length 19. *T. ellenbergeri*, n. sp.
- D. xiii-xv 12-13; A. iii 8-9; Sc.
 $27-30\frac{2\frac{1}{2}-3}{10}$; 7 to 9 gill-rakers;
 3 or 4 series of scales on the
 cheek; depth of body $2\frac{2}{3}$ to
 3 times in total length 20. *T. ovalis*, Steindr.
2. 5 to 7 series of scales on the cheek.
 Breast and belly naked.
- D. xv 13; A. iii 9; Sc. $34\frac{3\frac{1}{2}}{10}$;
 12 gill-rakers; depth of body
 $2\frac{3}{4}$ times in total length; caudal
 rounded 21. *T. woosnami*, Blgr.
- D. xv 10; A. iii 8; Sc. $33\frac{3}{8}$; 9 gill-
 rakers; depth of body $2\frac{3}{4}$ times
 in total length; caudal trun-
 cate 22. *T. jallae* Blgr.

II. Scales with more or less denticulate edge.

Caudal rounded or truncate, not at all emarginate.

1. Dorsal with 14 or 15 spines; eye 3 to 4 times in length of head; depth of body $2\frac{3}{4}$ to 3 times in total length; caudal rounded or rounded-subtruncate; 6 series of scales on cheek.

D. xv 14; A. iii 9; Sc. $34\frac{4\frac{1}{2}}{12}$;

pectoral as long as head . . . 23. *T. giardi*, Pellegr.

2. Dorsal with 15-17 spines (rarely 14); eye 4 to $4\frac{1}{2}$ times in length of head in adult; depth of body $2\frac{1}{2}$ to $3\frac{1}{4}$ times in total length; caudal rounded.

D. xiv-xvi 8-10; A. iii 7-8; Sc.

$30-33\frac{3-4}{11-12}$; teeth in 3 to 5

series; snout shorter than post-

ocular part of head . . . 24. *T. calliptera*, Günth.

3. Dorsal with 15-17 spines; eye $3\frac{1}{2}$ to $4\frac{3}{4}$ times in length of head; depth of body $2\frac{1}{2}$ to 3 times in total length; caudal rounded or rounded-subtruncate.

D. xvii 9; A. iii 8; Sc. $33\frac{5-6}{12}$; eye

$3\frac{1}{2}$ times in length of head;

teeth in 6 series, 40 in upper

jaw; caudal rounded . . . 25. *T. livingstonii*, Blgr.

D. xvi 11; A. iii 10; Sc. $30\frac{3\frac{1}{2}}{11}$;

eye $4\frac{7}{10}$ times in length of

head; teeth in 4 series, about

50 in upper jaw; caudal

rounded-subtruncate . . . 26. *T. kirkhami*, n. sp.

1. TILAPIA KAFUENSIS, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (8), x, 1912, p. 138, and Freshw. Fish. Africa, iii, p. 153, fig. 100 (1915).

Teeth in eight series, about 110 in the outer series of upper jaw. Depth of body $2\frac{1}{2}$ times in total length excluding caudal, length of head 3 times. Head $1\frac{3}{4}$ times as long as broad; snout rounded, with feebly concave upper profile, slightly broader than long, a little shorter than postocular part of head; eye $5\frac{3}{4}$ times in length of head, $\frac{2}{5}$ interorbital width, $\frac{3}{4}$ preorbital depth; mouth $\frac{2}{3}$ width of head, extending to between nostril and eye; 4 series of scales on the cheek, width of scaly part a little greater than diameter of eye. Gill-rakers moderate, 25 on lower part of anterior arch.

Dorsal xvi 13; last spine longest, $\frac{2}{5}$ length of head; longest soft ray $\frac{2}{3}$ length of head. Pectoral $1\frac{1}{8}$ times length of head, reaching

vertical of origin of anal. Ventral reaching to vent. Anal iii 11; 3rd spine not quite $\frac{1}{3}$ length of head. Caudal rounded; caudal peduncle as long as deep. Scales cycloid, $31\frac{4\frac{1}{2}}{16}$, lateral lines $\frac{2\frac{2}{6}}$.

Colour (of preserved specimen), dark brownish black above, lightish beneath; a dark opercular spot and 2 or 3 ill-defined black spots on the side below upper lateral line; soft dorsal and anal fins with light and dark spots between their rays.

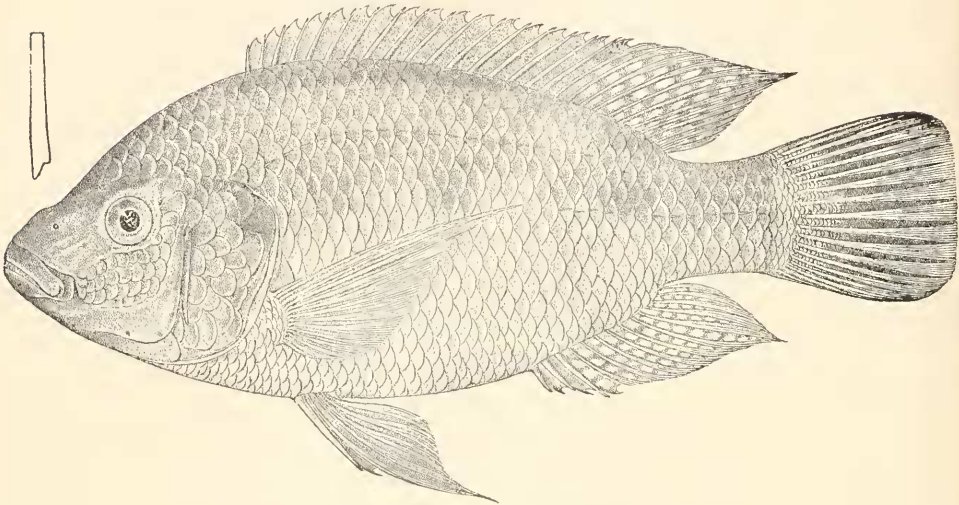


FIG. 119.—*Tilapia kafuensis*. Type. $\frac{1}{3}$.

One specimen, 298 mm. in length, from Bulawayo (Mr. F. D. McKean).

It is also reported from the Kafue River and from the Zambesi.

2. *TILAPIA INTERMEDIA*, n. sp.

Teeth slender, closely set, in 3 series on each jaw, 40–50 in outer series on upper jaw. Depth of body $2\frac{3}{5}$ to $2\frac{3}{4}$ times in total length excluding caudal, length of head $2\frac{3}{4}$ times. Head $1\frac{1}{5}$ to twice as long as broad; snout with straight upper profile, as long as broad, shorter than postocular part of head; eye 4 to $4\frac{1}{10}$ times in length of head, $\frac{2}{3}$ to $\frac{3}{4}$ interorbital width, slightly longer than preorbital depth; width of mouth about $\frac{1}{3}$ width of head, extending to behind nostril; scales on cheek in 2 to 3 series, width of scaly part about equal to or a little less than diameter of eye. Gill-rakers moderate, about 23 on lower part of anterior arch.

Dorsal xvi 12-13; last spine longest, about $\frac{2}{3}$ length of head; longest soft rays a little more than $\frac{1}{2}$ length of head. Pectoral a little shorter than head, reaching to vertical of origin of anal. Ventral extending to vent. Anal iii 11; 3rd spine about $\frac{1}{3}$ length of head. Caudal truncate; caudal peduncle as long as deep or a little deeper than long. Scales cycloid, $31\frac{4}{12}$; lateral lines $\frac{21-22}{13}$.

Colour (of preserved specimens) dark brown above, lighter below; 8 or 9 dark cross-bars on the body and a faint longitudinal streak from opercle to base of caudal; a dark opercular spot; vertical fins with faint dark and light spots forming oblique streaks; a dark spot at base of anterior rays of soft dorsal; snout dark.

Two specimens, 58 mm., 74 mm. in length respectively, from Sawmills, Bulawayo, Rhodesia (F. D. McKean).

This species closely resembles *T. sparrmani*, but the gill-rakers are far more numerous and the scale formula and markings differ slightly.

3. TILAPIA MOSSAMBICA, Peters.

Chromis (Tilapia) mossambicus, Peters, Mon. Berlin. Ac., 1852, p. 681.

Chromis niloticus, part., Peters, Arch. f. Nat., 1855, p. 267; Günth., Cat. Fish., iv, p. 510 (1862); Peters, Reise Mossamb., iv, p. 23, pl. iv, fig. 4 (1868).

Chromis mossambicus, part., Günth., t.c., p. 263.

Chromis dumerilii, Steindr., Verh. zool.-bot. Ges. Wien, xiv, 1864, p. 225, pl. vii, fig. 1.

Chromis niloticus, var. *mossambicus*, M. Web., Zool. Jahrb., Syst. x, 1897, p. 148.

Tilapia mossambica, Bouleng., Trans. Zool. Soc., xv, 1898, p. 4, Proc. Zool. Soc., 1899, p. 111, and Freshw. Fish. Africa, iii, p. 154, fig. 101, (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 309.

Tilapia dumerilii, Bouleng., Proc. Zool. Soc., 1899, p. 116; Pellegr., t.c., p. 317.

Teeth in 4 (young) to 7 series. Depth of body $2\frac{1}{4}$ to 3 times in total length excluding caudal, length of head $2\frac{1}{5}$ to $3\frac{1}{2}$ times. Head $1\frac{7}{10}$ to a little more than twice as long as broad, with concave upper profile; snout rounded, as broad as or a little broader than long, as long as or a little shorter than postocular part of head; eye $4\frac{3}{10}$ (young) to 6 times in length of head, $\frac{2}{3}$ to $\frac{3}{5}$ interorbital width, equal to or a little less than preorbital depth; mouth large, $\frac{7}{10}$ to $\frac{1}{2}$ width of head, extending to below anterior border of eye or not quite so far; 2 to 4 series

of scales on cheek, width of scaly part $\frac{1}{5}$ to a little more than diameter of eye. Gill-rakers short, 16 to 20 on lower part of anterior arch.

Dorsal xv-xvi 10-12; last spine longest, $\frac{1}{3}$ to $\frac{1}{2}$ length of head; longest soft ray $\frac{2}{3}$ to $\frac{9}{10}$ length of head. Pectoral $\frac{9}{10}$ to a little longer than head, reaching vertical of origin of anal or beyond. Ventral reaching vent or origin of anal. Anal iii 9-10; 3rd spine a little shorter than last dorsal spine. Caudal rounded in the adult, truncate in the young; caudal peduncle as long as deep or slightly deeper than long. Scales cycloid, 28-31 $\frac{3\frac{1}{2}-4\frac{1}{2}}{12-15}$, lateral lines $\frac{19-23}{12-6}$.

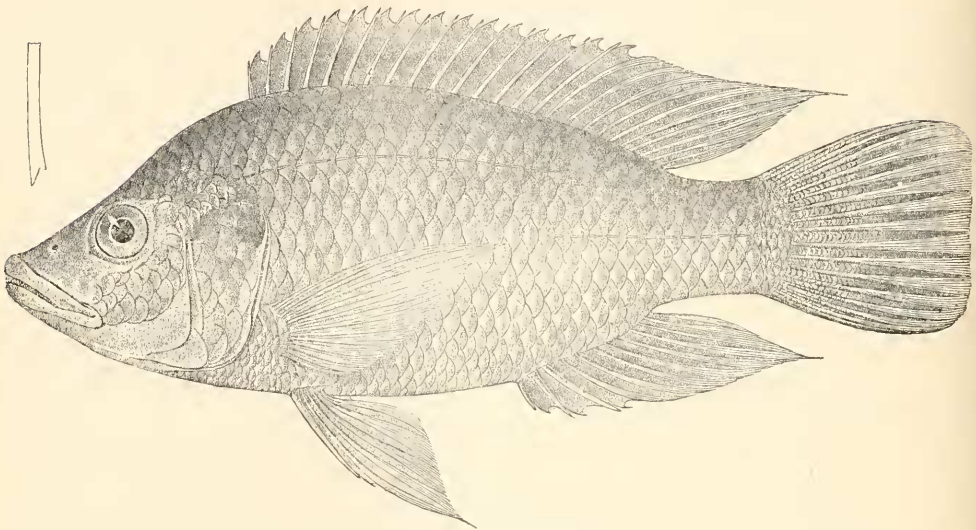


FIG. 120.—*Tilapia mossambica*. $\frac{5}{6}$.

Colour (of preserved specimens) brownish, reddish, or olive brown, usually darker above than below and the scales with dark centre or a band on outer rim; a dark opercular spot; dorsal, anal, and caudal generally dark or with dark spots; dorsal and caudal edged with yellowish white.

Five specimens, ranging from 125-262 mm. in length, from Manzemntonto River, Transvaal (Major J. Stevenson Hamilton).

Four specimens, ranging from 166-249 mm. in length, from Dwaars River, Transvaal.

One specimen, 176 mm. in length, from Lake N'gami (H. F. Kirkham).

Two specimens, 218 mm., 219 mm. in length respectively, from Piensaars River, Transvaal. Pretoria Museum.

The species appears also to range from German East Africa to Natal.

4. *TILAPIA VORAX*, Pfeff.

Chromis vorax, Pfeff, Jahrb. Hamb. Wiss. Anst. x, 1893, p. 151, pl. ii, figs. 9-11, and Thierw. O.-Afr., Fische, p. 12, fig. 8 (1896).

Tilapia vorax, Bouleng., Proc. Zool. Soc., 1899, p. 125, and Freshw. Fish. Afr., iii, p. 156, fig. 102 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 322.

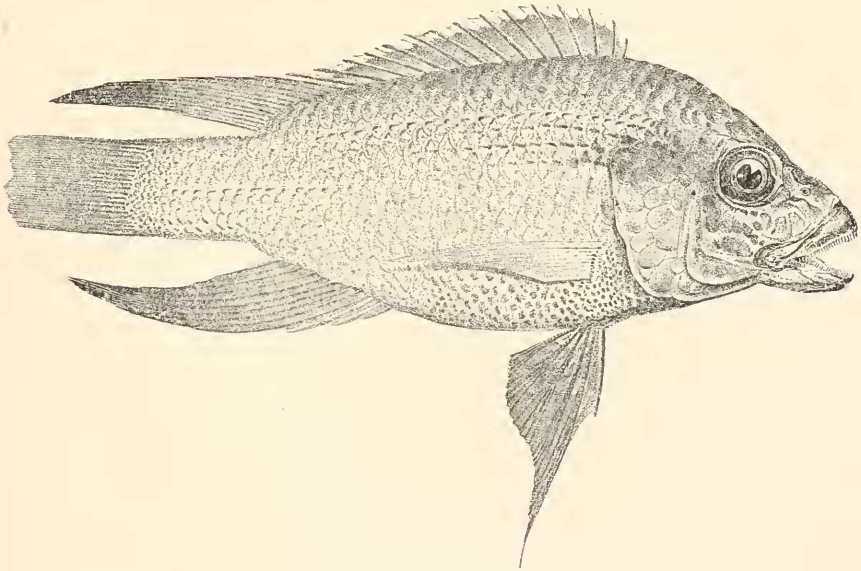


FIG. 121. — *Tilapia vorax*. Type, after Pfeffer (Jahrb. Hamb. Wiss. Anst., 1893). $\frac{3}{4}$.

Teeth small, in 4 rows, about 60 in outer series of upper jaw. Depth of body about equals length of head, $2\frac{2}{3}$ times in total length excluding caudal. Head twice as long as broad; snout with straight upper profile, equal to postocular part of head, about as broad as long, twice diameter of eye, which is 5 times in length of head and nearly twice interorbital width; mouth large, $\frac{1}{5}$ width of head, extending to anterior border of eye; 3 series of scales on the cheek, width of scaly part slightly less than diameter of eye. Gill-rakers short, 18 on lower part of anterior arch.

Dorsal xvi 11; last spine longest, $\frac{2}{5}$ length of head, middle soft rays produced, nearly $\frac{3}{4}$ length of head. Pectoral nearly as long as head, extending a little beyond vertical of origin of anal. Ventral reaching slightly beyond origin of anal. Anal iii 10; 3rd spine a little shorter than last dorsal spine. Caudal truncate, the angles slightly rounded; caudal peduncle as long as deep. Scales cycloid, $30\frac{3}{12}$; lateral lines $\frac{2}{14}$.

Colour (of preserved specimen) uniform dark olive-brown (almost black), belly greyish, cheeks and lower jaw white; a rather indistinct dark opercular spot; vertical fins and ventrals blackish; tip of dorsal and extremity of caudal lobes yellowish white.

One specimen, 161 mm. in length, from Umzemntonto River, Transvaal (Major J. Stevenson Hamilton).

This species is also reported from German East Africa and Mozambique.

The specimen above dealt with differs slightly in some respects from Dr. Boulenger's description of *T. vorax*, but there seems little reason to doubt that it is the same species.

5. *TILAPIA NATALENSIS*, M. Web.

Chromis niloticus, part., Peters, Arch. f. Nat., 1855, p. 267, and Reise Mossamb., iv, p. 23 (1868); Pfeff., Jahrb. Hamb. Wiss. Anst., x, 1893, p. 149, pl. iii, figs. 1-4, and Thierw. O.-Afr., Fische, p. 10, fig. (1896).

Chromis mossambicus, part., Günth., Cat. Fish., iv, p. 268 (1862).

Chromis natalensis, M. Web., Zool. Jahrb., Syst. x, 1897, p. 147.

Tilapia natalensis, Bouleng., Proc. Zool. Soc., 1899, p. 113, Poiss. Bass. Congo, p. 457 (1901), and Freshw. Fish. Afr., iii, p. 157, fig. 103 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 311.

Teeth in 3 (young) to 6 series, 50 (young) to 140 in outer series of upper jaw. Depth of body $2\frac{1}{5}$ to $2\frac{2}{5}$ times in total length excluding caudal, length of head $2\frac{2}{3}$ to $3\frac{1}{5}$ times. Head $1\frac{2}{3}$ to about twice as long as broad; snout rounded, with straight or slightly convex upper profile, as broad as or a little broader than long, $\frac{7}{10}$ to $\frac{9}{10}$ postocular part of head; eye 3 (young) to $5\frac{1}{2}$ times in length of head, $\frac{2}{5}$ to $\frac{3}{4}$ interorbital width, equal to or a little less or a little greater than preorbital depth; mouth moderate, $\frac{2}{3}$ to $\frac{3}{4}$ width of head, extending to between nostril and eye; 2 or 3 series of scales on the cheek, width of scaly part not greater than diameter of eye. Gill-rakers short, 16 to 20 on lower part of anterior arch.

Dorsal xv-xvii 10-12; last spine longest, $\frac{1}{2}$ to a little more than $\frac{1}{2}$ length of head; longest soft rays $\frac{3}{5}$ to $\frac{4}{5}$ length of head. Pectoral equal to or a little longer than head, reaching to vertical of origin of anal or beyond. Ventral reaching vent or scarcely to origin of anal. Anal iii 9-10; 3rd spine a little shorter or equal to last dorsal spine. Caudal truncate or very slightly emarginate, the angles sometimes rounded; caudal peduncle as long as deep or slightly deeper than long. Scales cycloid, 27-32 $\frac{3\frac{1}{2}-4\frac{1}{2}}{13-16}$; lateral lines $\frac{17-21}{11-17}$.

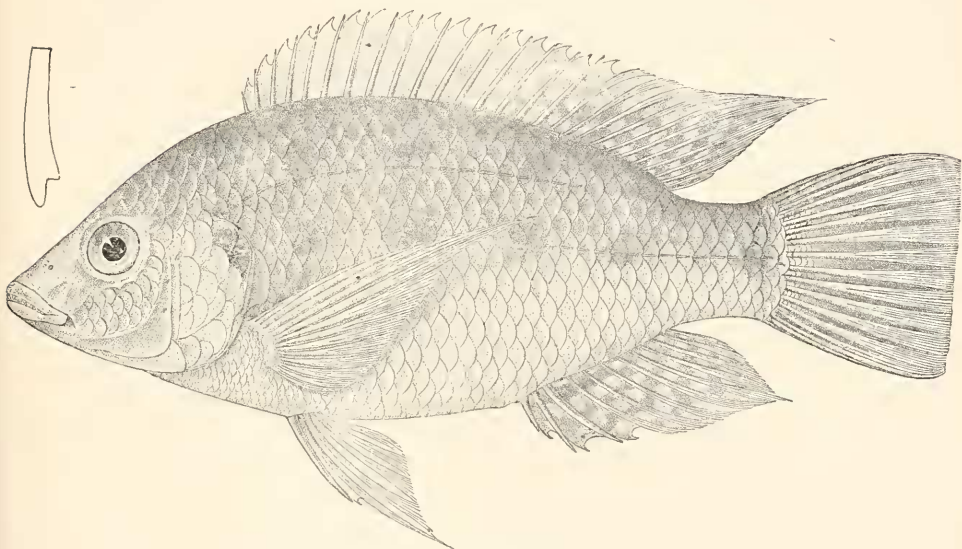


FIG. 122.—*Tilapia natalensis*. $\frac{5}{6}$.

Colour (of preserved specimens), brown or reddish brown above, lighter or whitish beneath; a blackish opercular spot, sometimes followed by a more or less distinct series of similar spots along the side of the body above and below the upper lateral line; young usually with 7 or 8 more or less distinct vertical bars often in addition to the 2 series of blackish spots; vertical fins uniform or with small round blackish spots or light spots separated by a dark network.

Eight specimens, ranging from 55-98 mm. in length, from Lakeside, Cape Peninsula (C. Sullivan).

Two specimens, 73 mm., 131 mm. in length respectively, from Buffalo River, East London (Mr. Wood).

One specimen, 154 mm. in length, from Blind River, Nahoon, East London (brak water) (Mr. Brooking).

Four specimens, ranging from 134–144 mm. in length, from Kanoozha River, East London.

Four specimens, ranging from 77–122 mm. in length, from Umkomas River, Natal (Dr. Gilechrist).

Three specimens, ranging from 60–89 mm. in length, from Umbeluzi, Swaziland (Mr. Howard).

Two specimens, 26 mm., 32 mm. in length respectively, from Komati Poort, Transvaal.

Thirty-five specimens, ranging from 30–83 mm. in length, from Nquametzi River, Transvaal (Major J. Stevenson Hamilton).

Twenty-two specimens, ranging from 34–99 mm. in length, from Sabi River, Transvaal (Major J. Stevenson Hamilton).

One specimen, 142 mm. in length, from Manzemtonto River, Transvaal (Major J. Stevenson Hamilton).

Ten specimens, ranging from 81–128 mm. in length, from Dwaars River, Transvaal.

Six specimens, ranging from 105–167 mm. in length, from Pienaar's River, Transvaal. Pretoria Museum.

Two specimens, 114 mm., 115 mm. in length respectively, from Umniati River, Rhodesia. Bulawayo Museum, collected by Mennell.

One specimen, 147 mm. in length, from Salisbury, Rhodesia (J. H. Elliott Darling).

6. *TILAPIA MACROCHIR*, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (8), x, 1912, p. 139, and Freshw. Fish. Africa, iii, p. 160, fig. 105 (1915).

Teeth in five series, about 80 in outer series of upper jaw. Depth of body twice in total length excluding caudal, length of head $3\frac{1}{7}$ times. Head $1\frac{2}{5}$ times as long as broad, upper profile descending in a strong curve; snout rounded, with concave upper profile, a little broader than long, shorter than postocular part of head; eye $5\frac{1}{2}$ times in length of head, $\frac{2}{3}$ interorbital width, less than preorbital depth; mouth rather small, extending to between nostril and eye; scales on cheek in 2 or 3 series, width of scaly part a little less than diameter of eye. Gill-rakers moderate, 25 on lower part of anterior arch.

Dorsal xvi 11; last spine longest, about $\frac{1}{2}$ length of head; longest soft ray nearly equals length of head. Pectoral $1\frac{1}{4}$ length of head, reaching beyond vertical of origin of anal. Ventral reaching to vent. Anal iii 10; 3rd spine $\frac{1}{3}$ length of head. Caudal slightly emarginate; caudal peduncle deeper than long. Scales cycloid, $30\frac{2\frac{1}{2}}{13}$; lateral lines $\frac{2}{1}\frac{1}{2}$.

Colour (of preserved specimen), blackish, base of scales dark ; a dark opercular spot ; tip of dorsal fin and distal extremity of anal whitish, indistinct dark and light longitudinal streaks on dorsal.

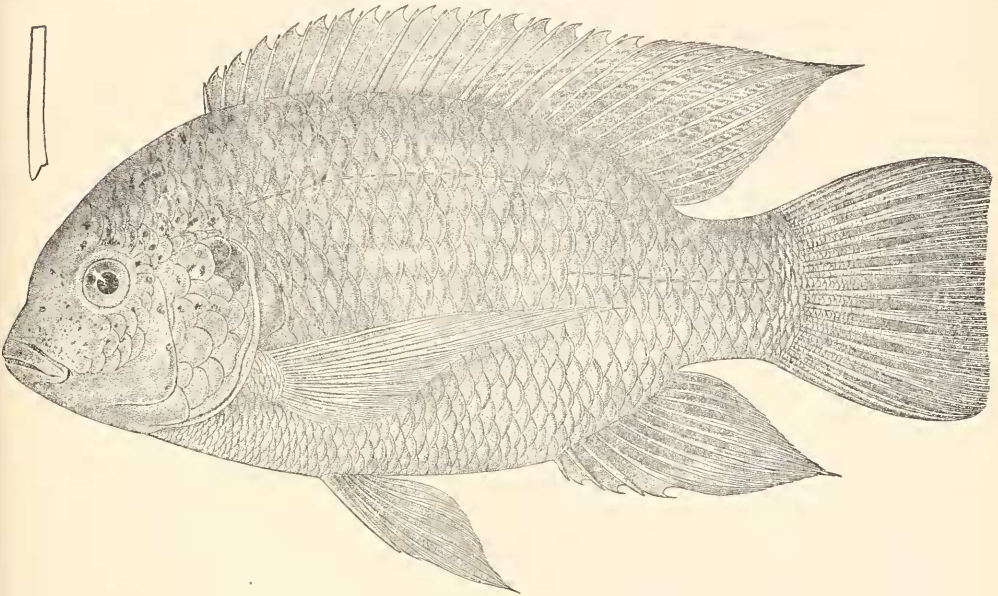


FIG. 123.—*Tilapia macrochir*. Type. $\frac{1}{3}$.

One specimen, 292 mm. in length, from Victoria Falls, Zambesi River (F. Rumsay). Bulawayo Museum.

It is also reported from Lakes Bangwelu and Mweru.

7. *TILAPIA SHESHEKENSIS*, n. sp.

Teeth small, in 3 series, 60 (circa) in outer row on upper jaw. Depth of body $2\frac{1}{5}$ times in total length excluding caudal, length of head $2\frac{1}{5}$ times. Head nearly twice as long as broad, upper profile elevated ; snout $1\frac{1}{5}$ times as broad as long, $\frac{7}{10}$ length of postocular part of head ; eye $3\frac{1}{2}$ times in length of head, $\frac{3}{4}$ interorbital width, $1\frac{2}{5}$ as long as least depth of preorbital ; mouth nearly $\frac{2}{3}$ width of head, extending to between nostril and eye ; 2 series of scales on the cheek, width of scaly part nearly $\frac{3}{5}$ diameter of eye. Gill-rakers short and thick, 24 on lower part of anterior arch.

Dorsal xvii 12 ; spines subequal from the 6th ; longest spines $\frac{2}{5}$ length of head ; longest soft rays $\frac{3}{5}$ length of head $\frac{1}{2}$. Pectoral $1\frac{1}{6}$

times length of head, reaching to about middle of anal. Ventral $\frac{4}{5}$ length of head, reaching scarcely to anal. Anal iii 9, 3rd spine slightly longer than longest dorsal spines. Caudal truncate, slightly emarginate; caudal peduncle $1\frac{1}{6}$ times as deep as long. Scales cycloid, $28\frac{4}{11}$; lateral lines $\frac{2}{12}$.

Colour (of preserved specimen) greyish-brown above, whitish below; scales dark in centre, forming indistinct longitudinal streaks between the series; about 10 more or less distinct dark cross-bars on body—the first extending across the nape, the next starting about the level of the opercular spot crosses in front of the origin of dorsal fin, the 7th below anterior rays of soft dorsal, or extends downwards to just below the median line; a dark opercular spot; dorsal with oblique dark bars enclosing whitish spots, especially on soft portion; anal with dark and light spots.

One specimen, 62 mm. in length, from Shesheke, Southern Rhodesia (Rev. L. Jalla).

This species resembles *T. natalensis* in many respects, but has a greater number of gill-rakers, the diameter of eye is much greater than least depth of preorbital, lateral line has fewer scales transversely, and the colour markings are different.

8. *TILAPIA GALILAEA*, Art.

Sparus galilaeus, Artedi, in Hasselq. Iter Palaest., p. 343 (1757).

Tilapia pleuromelas, A. Dum., Arch. Mus., x, 1859, p. 253.

Tilapia lateralis, A. Dum., l.c.

Tilapia macrocentra, A. Dum., t.c., p. 256.

Chromis ? galilaeus, Günth., Cat. Fish., iv, p. 273 (1862).

Chromis niloticus, part., Günth., t.c., p. 267, Proc. Zool. Soc., 1864, p. 490, and Petherick's Trav., ii, p. 216 (1869); Steindr., Sitzb. Ak. Wien, lx, i, 1870, p. 964, pl. iv, fig. 1.

Chromis pleuromelas, Günth., Cat. Fish., iv, p. 271 (1862).

Chromis lateralis, Günth., t.c., p. 272.

Chromis niloticus, Steindr., Verh. zool.-bot. Ges. Wien, xiv, 1864, p. 226; Tristram, Faun. Palest., pl. xviii, fig. 1 (1884).

Chromis tiberiadis, Lortet, Ann. Mus. Lyon, iii, 1883, p. 135, pl. vi.

Chromis microstomus, Lortet, t.c., p. 139, pl. viii, fig. 1.

Tilapia galilaea, Bouleng., Proc. Zool. Soc., 1899, p. 114, Fish. Nile, p. 531, pl. xciv (1907), and Freshw. Fish. Afr., iii, p. 169, fig. 109 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 311.

Teeth in three to four series, 64 (circa) in outer series of upper jaw. Depth of body $2\frac{1}{5}$ times in total length excluding caudal, length of

head $2\frac{9}{10}$ times. Head with elevated profile, slightly more than twice as long as broad; snout rounded, with straight upper profile, as long as broad, nearly $\frac{3}{4}$ postocular part of head; eye $4\frac{1}{3}$ times in length of head, a little more than $1\frac{2}{3}$ times in interorbital width, a little longer than least depth of preorbital; mouth small, slightly more than $\frac{1}{2}$ width of head, reaching to between nostril and eye; scales on cheek in 3 series, width of scaly part $\frac{1}{5}$ diameter of eye. Gill-rakers short, slender, 23 on lower part of anterior arch.

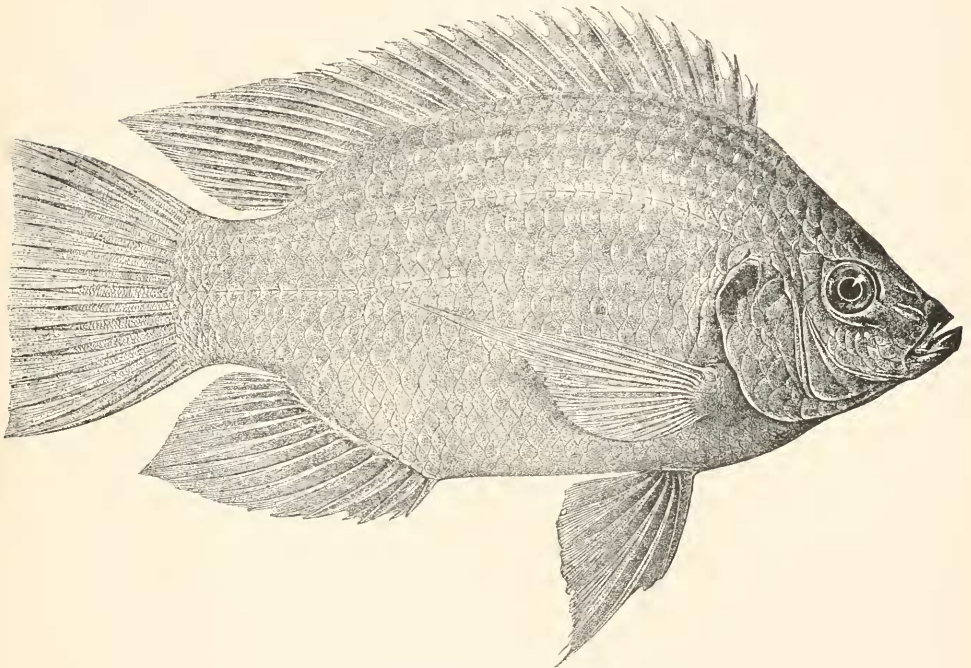


FIG. 124.—*Tilapia galilaea*. Khartum (F.N.). $\frac{1}{3}$.

Dorsal xvii 12; spines strong, last spine longest, nearly $\frac{1}{2}$ length of head; longest soft rays $\frac{2}{3}$ length of head. Pectoral $1\frac{1}{7}$ times length of head, extending to beyond vertical of origin of anal. Ventral reaching to vent. Anal iii 11; 3rd spine a little shorter than longest dorsal spine. Caudal truncate; caudal peduncle $1\frac{1}{7}$ times as deep as long. Scales cycloid, $30\frac{1}{4}$; lateral lines $\frac{2\cdot0}{1\cdot2}$.

Colour (of preserved specimen), reddish brown above, whitish below, with indistinct, narrow, dark cross-bands on body; a dark opercular spot; an indistinct dark spot on base of anterior soft rays of dorsal; tip of ventral black.

One specimen, 95 mm. in length, from Victoria Falls, Zambesi River (Mr. J. W. Soper). Bulawayo Museum.

This species is also reported from Lake Galilee and Jordan; Nile system up to Blue Nile and Bahr-el-Gebel; Senegal; Gambia; Portuguese Guinea; Lagos; Niger; ? Banzyville, Ubanghi.

9. *TILAPIA ANDERSONII*, Cast.

Chromys andersonii, Casteln., Mém. Poiss. Afr. Austr., p. 14 (1861).

Chromys chapmani, Casteln, op. cit., p. 15.

? *Chromys sparmanni* (non A. Smith), Casteln., t.c., p. 12.

Melanogenes microcephalus (non Bleek.), Sauvage, Bull. Soc. Zool. France, 1884, p. 196, fig.

Tilapia flavomarginata, Bouleng., Ann. Mus. Congo, Zool., i, p. 123, pl. xlvii (1899), Poiss. Bass. Congo., p. 458 (1901), and Ann. and Mag. Nat. Hist. (8), vi, 1910, p. 560; Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 313, and Bull. Soc. Philom. (9), ix, 1907, p. 37, fig.

Tilapia andersonii, Bouleng., Trans. Zool. Soc., xviii, 1911, p. 415, and Freshw. Fish. Afr., iii, p. 171, fig. 110 (1915).

Teeth in a band of four (young) to eight series. Depth of body $2\frac{3}{10}$ to $2\frac{1}{2}$ times in total length excluding caudal, length of head 3 to $3\frac{1}{4}$ times. Head $1\frac{1}{2}$ to twice as long as broad; snout rounded, with straight or slightly convex upper profile, as broad as or a little broader than long, a little shorter than postocular part of head; eye $4\frac{1}{2}$ to $5\frac{1}{2}$ times in length of head, 2 to $2\frac{1}{5}$ in interorbital width, equal to or a little less than preorbital depth; mouth moderate, $\frac{2}{5}$ to $\frac{3}{4}$ width of head, extending to between nostril and eye; 3 series of scales on the cheek, width of scaly part not greater than diameter of eye. Gill-rakers moderately long, 20 to 24 on lower part of anterior arch.

Dorsal xvi 11-12; last spine longest, $\frac{2}{5}$ to $\frac{3}{5}$ length of head; longest soft rays $\frac{1}{5}$ to 1 length of head. Pectoral 1 to $1\frac{1}{3}$ times length of head, reaching vertical of origin of anal or beyond. Ventral reaching to vent or beyond. Anal iii 10-11; 3rd spine $\frac{1}{3}$ to $\frac{2}{5}$ length of head. Caudal truncate or slightly emarginate; caudal peduncle deeper than long. Scales cycloid, 30-32 $\frac{4}{12-15}$; lateral lines $\frac{20-23}{13-15}$.

Colour (of preserved specimens) blackish brown, or dark uniform brown, lighter beneath; scales edged with whitish; a dark opercular spot; vertical fins dark, with indistinct dark streaks on dorsal; dorsal faintly edged with yellowish white.

One specimen, 268 mm. in length, from Zambesi River, about 3 miles above the Victoria Falls (Mr. F. W. Sykes).

One specimen, 258 mm. in length, from Kafue River, Rhodesia (C. F. Molyneux).

One specimen, 168 mm. in length, from Lake Ngami (H. F. Kirkham).

It is also reported from Angola, Congo, and Gaboon.

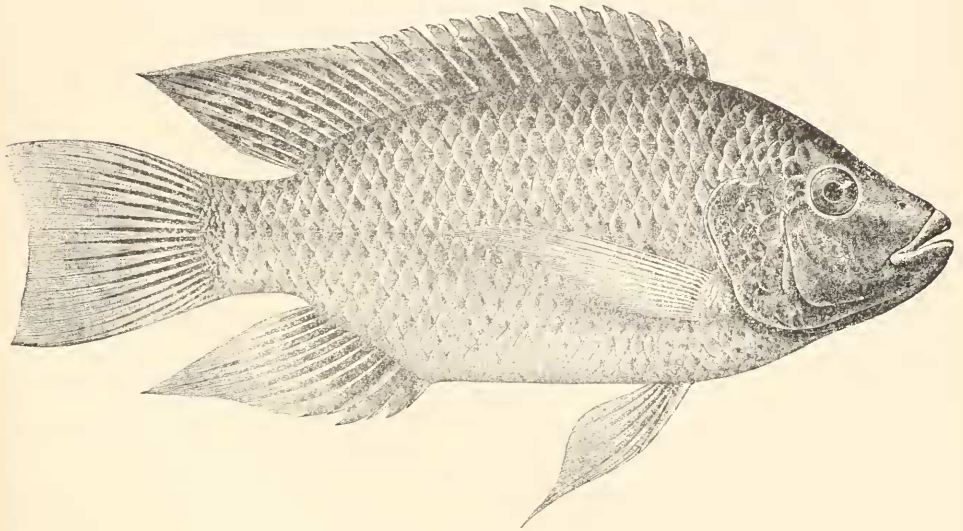


FIG. 125.—*Tilapia andersonii*. ♀.

According to Mr. Sykes the Batoka name of the specimen sent by him is *Tsheri*, the Barotse name *Appapati*. He states that the fish is "much esteemed by Europeans and natives, not having a superfluity of bones and hardly any of the muddy flavour usual with freshwater fish. A favourite dish of Lewanika. Can be caught on hooks baited with locusts and would probably rise to a fly."

10. TILAPIA SQUAMIPINNIS, Günth.

Chromis squamipinnis, Günth., Proc. Zool. Soc., 1864, p. 311, and 1893, p. 621, pl. liii.

Tilapia squamipinnis, Bouleng., Trans. Zool. Soc., xv, 1898, p. 4, and Proc. Zool. Soc., 1899, p. 177; Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 318; Bouleng., Freshw. Fish. Africa, iii, p. 183, fig. 118, (1915).

Depth of body $2\frac{1}{2}$ to $2\frac{2}{3}$ times in total length, length of head $2\frac{2}{3}$ to 3 times. Head $1\frac{3}{4}$ to 2 times as long as broad, snout rounded,

with straight or convex upper profile, about $\frac{2}{3}$ as long as broad, $\frac{3}{4}$ to $\frac{4}{5}$ postocular part of head; eye 3 (young) to $5\frac{1}{2}$ times in length of head, $1\frac{1}{3}$ (young) to $2\frac{2}{3}$ times in interorbital width, equal to pre-orbital depth in adult; mouth moderate, $\frac{1}{2}$ to $\frac{2}{3}$ width of head, extending to between nostril and eye; teeth in 4 (young) to 7 series,* 50 (young) to 110 in outer series of upper jaw; 2 series of scales on the cheek, width of scaly part less than diameter of eye. Gill-rakers moderate, 17 to 21 on lower part of anterior arch.

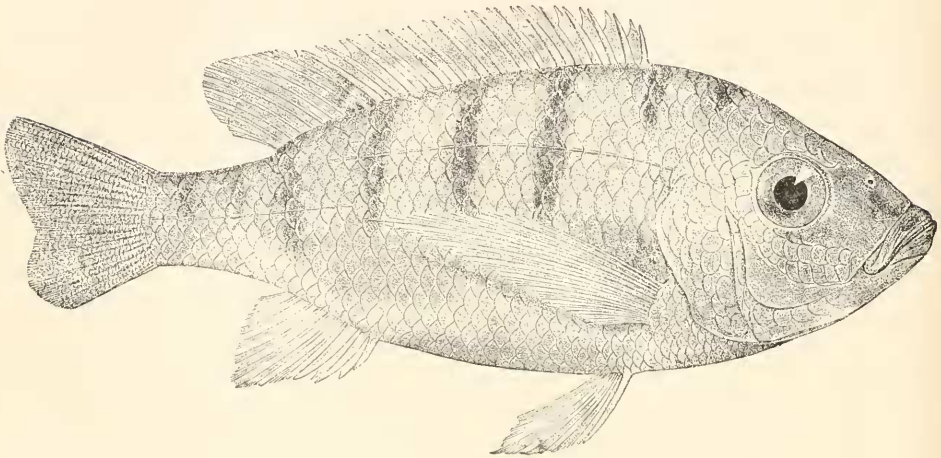


FIG. 126.—*Tilapia squamipinnis*. Type, after Günther (P.Z.S., 1893). $\frac{2}{3}$.

Dorsal xvi 10-11; spines subequal from middle ones, or last longest, $\frac{2}{7}$ to $\frac{1}{2}$ length of head; longest soft rays $\frac{1}{3}$ to $\frac{2}{5}$ length of head. Anal iii 8-9; third spine $\frac{1}{4}$ to $\frac{2}{7}$ length of head. Pectoral as long as or slightly longer than head, reaching origin of anal or a little beyond. Ventral reaching vent or not so far. Caudal densely scaled, rounded with a feeble median notch, or upper angle pointed. Caudal peduncle a little longer than deep. Scales cycloid, 32-36 $\frac{3\frac{1}{2}}{14-16}$; lateral lines $\frac{20-22}{12-18}$.

Pale greyish olive, with or without 8 more or less regular blackish cross-bars, or dark brown to bluish-black; soft dorsal with oblique dark streaks, or fins bluish-black with a yellow or orange edge; the blackish cross-bars constant in the young, which bear a large black spot on the anterior part of the soft dorsal.

* "In one of the specimens received from Capt. Rhoades, all the outer teeth are conical, without secondary cusps."

Total length 300 millim.

Lake Nyassa and Upper Shiré River."

Three specimens, ranging from 74-77 mm. in length, received from Kafue River, Rhodesia (Mr. J. Hotchkiss), appear to belong to this species, but owing to their mutilated condition it is difficult to identify them satisfactorily.

11. *TILAPIA MELANOPLEURA*, A. Dum.

Tilapia melanopleura, A. Duméril, Arch. Mus., x, 1859, p. 252, pl. xxii, fig. 1; Bouleng., Proc. Zool. Soc., 1889, p. 123, Trans. Zool. Soc., xviii, 1911, p. 417, and Freshw. Fish. Afr., iii, p. 190, fig. 123 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 329, and Bull. Soc. Philom. (9), x, 1908, p. 134.

Tilapia affinis, A. Dum., t.c., p. 255; Bouleng., t.c., p. 127; Pellegr., Bull. Mus. Paris, 1900, p. 277.

Tilapia polycentra, A. Dum., t.c., p. 254; Bouleng., t.c., p. 128.

Chromis polycentra, Günth., Cat. Fish., iv, p. 270 (1862).

Chromis latus, Günth., t.c., p. 271; Steindr., Verh. zool.-bot. Ges. Wien, xiv, 1864, p. 227, pl. viii, figs. 1 and 2.

Chromis melanopleura, Günth., t.c., p. 272.

Chromis aureus, Steindr., t.c., p. 229, pl. viii, fig. 5.

Chromis niloticus, part., Steindr., Sitzb. Ak. Wien, lx, 1870, p. 96.

Chromis coeruleomaculatus, Rochebr., Bull. Soc. Philom. (7), iv, 1880, p. 166, and Act. Soc. Linn. Bord. (4), vi, 1883, p. 132, pl. iv, fig. 3.

Chromis faidherbi, Rochebr., tt.c.c., p. 167, and p. 134, pl. v., fig. 5.

Chromis affinis, Rochebr., Act. Soc. Linn. Bord. (4), vi, 1883, p. 131.

Chromis ogowensis, Günth., Ann. and Mag. Nat. Hist. (6), xvii, 1896, p. 271, and Proc. Zool. Soc., 1899, p. 717, and 1902, ii, p. 231.

Chromis rendalli, Bouleng., Proc. Zool. Soc., 1896, p. 915, fig.

Tilapia rendalli, Bouleng., Trans. Zool. Soc., xv, 1898, p. 4, and Proc. Zool. Soc., 1899, p. 126.

Tilapia lata, Bouleng., Proc. Zool. Soc., 1899, p. 125, and Poiss. Bass. Congo, p. 466 (1901); Steindr., Denkschr. Ak. Wien, lxxxix, 1913, p. 60.

Tilapia sezfasciata, Pellegr., Bull. Mus. Paris, 1900, p. 276.

Chromis discolor, Günth., Proc. Zool. Soc., 1902, ii, p. 332.

Tilapia latifrons, Bouleng., Trans. Zool. Soc., xvii, 1906, p. 571, pl. xl.

Teeth in 3 (young) to 5 more or less regular series, the outer largest and separated from the others by a rather wide interspace.

Depth of body 2 to $2\frac{2}{5}$ times in total length excluding caudal; length of head 3 to $3\frac{1}{3}$ times. Head $1\frac{3}{4}$ to 2 times as long as broad; snout with straight or convex, or slightly concave upper profile, as long as broad or a little broader than long, as long as or slightly longer than postocular part of head; eye $3\frac{1}{5}$ (young) to $5\frac{1}{5}$ times in length of head, 1 (young) to $2\frac{1}{4}$ times in interorbital width, less than preorbital depth in adult; mouth moderate, $\frac{1}{2}$ to $\frac{3}{4}$ width of head, extending to between nostril and eye; 3 or 4 series of scales on the cheek, width

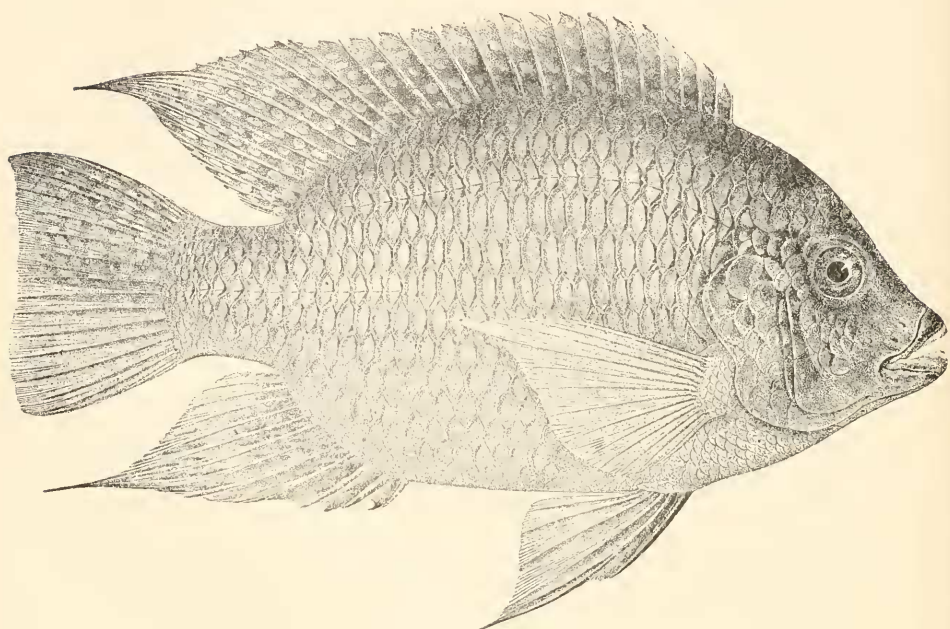


FIG. 127.—*Tilapia melanopleura*. Type of *T. latifrons* (Tr. Z.S., 1906). $\frac{1}{2}$.

of scaly part greater than diameter of eye in adult. Gill-rakers short, 8 to 12 on lower part of anterior arch.

Dorsal xiv-xvi 10-12, last spine longest, $\frac{2}{5}$ to over $\frac{1}{2}$ length of head; middle soft rays slightly produced in adult, usually as long as or a little longer than head. Pectoral 1 to $1\frac{1}{5}$ times as long as head, extending to vent or nearly to vertical of origin of anal. Ventral reaching to vent or beyond. Anal iii 9-10; third spine usually shorter than the longest dorsal spine. Caudal truncate or feebly emarginate; caudal peduncle deeper than long. Scales cycloid or very feebly denticulate, 28-30 $\frac{3\frac{1}{2}}{11-13}$; lateral lines $\frac{20-21}{12-15}$.

Colour (of preserved specimens) brown or dark olive-brown above, sometimes whitish on gular region, with or without 4 to 6 very indistinct darker bars; a dark opercular spot; dorsal fin with oblique dark streaks, with or without round light spots; a more or less indistinct large black spot at the base of anterior part of soft dorsal, sometimes disappearing with age; caudal sometimes with round light spots, or with a dark network.

One specimen, 260 mm. in length from Sabi River, Transvaal (Major J. Stevenson Hamilton).

Thirteen specimens, ranging from 54–95 mm. in length from Sabi River, Transvaal (Major J. Stevenson Hamilton).

One specimen, 232 mm. in length, from Manzembtento River, Transvaal (Major J. Stevenson Hamilton).

One specimen, 228 mm. in length, from Sabi River, Transvaal (Major J. Stevenson Hamilton).

One specimen, 180 mm. in length, from Thabina River, Transvaal. Pretoria Museum.

One specimen, 254 mm. in length, from Kafue River, Rhodesia (J. Hotchkiss).

One specimen, 247 mm. in length, from Victoria Falls, Zambesi River (G. Arnold). Bulawayo Museum.

One specimen, 109 mm. in length, from Lake Ngami (H. F. Kirkham).

A very widely distributed species, originally described from the Senegal (types in the Paris Museum), but now known from West Africa as far south as Angola, from the Congo and Zambesi systems, the Transvaal, Zululand, and Bechuanaland.

The specimens from the Gold Coast have been named *T. discolor*, and those from the Gaboon *T. lata* and *T. ogoensis*, whilst the names *T. latifrons* and *T. reudalli* apply to those from Lake Tanganyika and the Zambesi respectively. Perhaps some of these names may have to be revised when the state of our knowledge permits a division into subspecies, an attempt at which the author of the 'Catalogue of African Freshwater Fishes' has regarded as premature.

12. *TILAPIA ARNOLDI, n. sp.

Teeth in 3 rows; those of outer row larger, slender, close-set, about 50 in upper jaw. Depth of body $2\frac{1}{3}$ times in total length excluding caudal, length of head 3 times. Head $1\frac{1}{3}$ times as long as broad; snout short, with convex upper profile, $1\frac{1}{3}$ times as broad as long.

$\frac{2}{3}$ length of postocular part of head; eye large, $2\frac{2}{3}$ times in length of head, equals interorbital width; least depth of preorbital equals $\frac{1}{2}$ diameter of eye; mouth nearly $\frac{3}{5}$ width of head, reaching to below anterior border of eye; 2 series of scales on the cheek, depth of scaly part $\frac{2}{3}$ diameter of eye. Gill-rakers short, thick, 15 on lower part of anterior arch.

Dorsal xv 11; spines subequal from the 6th, last spine $\frac{3}{5}$ length of head; soft rays a little longer than longest spines. Pectoral nearly as long as head, reaching to vent. Ventral $\frac{7}{8}$ length of head, outer rays slightly produced, reaching to vent. Anal iii 9, 3rd spine a little shorter than longest dorsal spine. Caudal subtruncate; caudal peduncle $1\frac{1}{7}$ as deep as long. Scales cycloid, $27\frac{1}{11}$; lateral lines $1\frac{8}{10}$.

Colour (of preserved specimen) olive brown, light on belly, scales with dark outer edge, indistinct dark cross-bars on body; an indistinct dark opercular spot; a black spot at base of anterior rays of soft dorsal and one or two whitish spots enclosed by dark streaks; anal dark at base with a light outer half; caudal dark at base, light in centre, a black outer ridge.

One specimen, 48 mm. in length, from Mazoe River, Rhodesia (Mr. G. Arnold).

13. *TILAPIA SWIERSTRAE*, n. sp.

Teeth in 5 series, those of the outer row much stronger and separated from the 4 irregular inner rows by a short interspace; 60 teeth in outer series on upper jaw. Depth of body $2\frac{1}{3}$ times in total length excluding caudal, length of head $3\frac{1}{3}$ times. Head elevated, the profile making a bold curve, $1\frac{3}{5}$ times as long as broad; snout obtuse, with convex upper profile, as long as broad and equal to postocular part of head; eye $5\frac{1}{10}$ times in length of head, $\frac{1}{2}$ interorbital width, $\frac{7}{10}$ least depth of preorbital; mouth $\frac{4}{5}$ width of head, reaching scarcely to vertical of anterior margin of eye, lips moderate; 4 series of scales on cheek, width of scaly part $1\frac{1}{3}$ times diameter of eye. Gill-rakers short, some of them bifid, 8 on lower part of anterior arch.

Dorsal xvi 12; last spine longest, a little more than $\frac{1}{2}$ length of head; longest soft rays produced, a little longer than head. Pectoral $1\frac{1}{6}$ times length of head, reaching to vent. Ventral reaching to vent. Anal iii 10; 3rd spine a little shorter than longest dorsal spine. Caudal truncate; caudal peduncle $1\frac{1}{4}$ times as deep as long. Scales cycloid, $30\frac{3}{12}$, lateral lines $2\frac{2}{14}$.

Colour (of preserved specimen) reddish brown, lighter beneath,

scales dark at the base; a dark opercular spot; soft dorsal with dark streaks enclosing white spots; caudal with dark spots, more plainly visible on upper lobe.

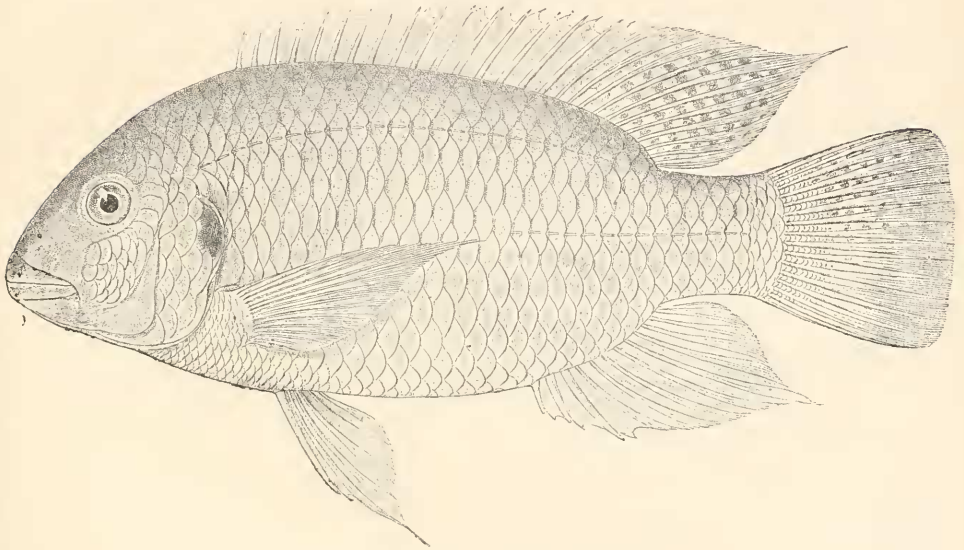


FIG. 128.—*Tilapia swierstrae*. Type.

One specimen, 222 mm. in length, from Thabina River, Transvaal (Mr. C. J. Swierstra).

14. *TILAPIA MACKEANI*, n. sp.

Teeth in 4 series, those of the outer row larger; 60 in outer series on upper jaw. Depth of body $2\frac{1}{2}$ times in total length excluding caudal, length of head $3\frac{2}{3}$ times. Head with elevated and rounded profile, $1\frac{1}{2}$ times as long as broad; snout with slightly concave upper profile, as long as broad and equal to postocular portion of head; eye $4\frac{4}{5}$ times in length of head, $\frac{1}{2}$ interorbital width, $\frac{3}{4}$ least depth of preorbital; mouth $\frac{2}{3}$ width of head, extending to between nostril and eye; four to five series of scales on the cheek, width of scaly part $1\frac{1}{3}$ times diameter of eye. Gill-rakers, 9 on lower part of anterior arch.

Dorsal xvi 12; spines increasing in length to the last, which is nearly $\frac{1}{2}$ length of head; longest soft rays $\frac{9}{10}$ length of head. Pectoral $1\frac{1}{5}$ times length of head, reaching to vent. Ventral not reaching vent. Anal iii 10; 3rd spine a little more than $\frac{1}{4}$ length of head. Caudal

rounded; caudal peduncle nearly $1\frac{1}{4}$ times as deep as long. Scales cycloid, $29\frac{3\frac{1}{2}}{12}$; lateral lines $\frac{21}{12}$.

Colour (of preserved specimen) dark greyish above, whitish below, scales dark at the base; a dark opercular spot; 4 or 5 indistinct dark cross-bars on body; indistinct dark bar across nape from opercle to opercle and a faint one from eye to angle of mouth; dorsal with dark streaks and light spots; caudal with dark spots on upper lobe.

One specimen, 270 mm. in length, from Sawmills, Bulawayo, Rhodesia (Mr. F. D. McKean).

15. *TILAPIA SYKESI*, n. sp.

Teeth in six series, those of the outer row enlarged and separated from the inner rows by a narrow interspace; about 50 teeth in outer series on upper jaw. Depth of body $2\frac{2}{3}$ times in total length excluding caudal, length of head $3\frac{1}{5}$ times. Head $1\frac{2}{3}$ times as long as broad, upper profile convex; snout with straight upper profile, $1\frac{2}{5}$ times as long as broad, a little longer than postocular part of head; eye $5\frac{1}{3}$ times in length of head, a little more than $\frac{1}{2}$ interorbital width, $\frac{5}{8}$ least depth of preorbital; mouth $\frac{3}{4}$ width of head, reaching to between nostril and eye; three series of scales on cheek, depth of scaly part $1\frac{1}{4}$ times diameter of eye. Gill-rakers short, 9 on lower part of anterior arch.

Dorsal xvi 11; last spine longest, nearly $\frac{1}{2}$ length of head; middle soft rays longest, as long as head. Pectoral a little longer than head, reaching to vent. Ventral reaching to vent or slightly beyond. Anal iii 9; 3rd spine $\frac{3}{10}$ length of head. Caudal truncate; caudal peduncle $1\frac{1}{3}$ times as deep as long. Scales cycloid, $30\frac{3\frac{1}{2}}{12}$, lateral lines $\frac{20}{12}$.

Colour (of preserved specimen) brown above, light yellow below, scales dark at base; a large dark opercular spot; dorsal and caudal fins with dark spots or streaks.

One specimen, 254 mm. in length, from Zambesi River, 3 miles above Victoria Falls. From Mr. F. W. Sykes, who gives the native name as *Apapati*, which appears also to be the native name of a somewhat similar species, *T. andersoni*.

16. *TILAPIA DRURYI*, n. sp.

Teeth, an outer row of small bicuspoid teeth, separated by a slight interspace from 6 inner rows of smaller tricuspoid teeth; about 70 teeth in outer series on upper jaw. Depth of body $2\frac{1}{2}$ times in total length

excluding caudal, length of head $3\frac{1}{5}$ times. Head $1\frac{7}{10}$ times as long as broad, upper profile descending in a bold curve; snout with concave upper profile, $1\frac{1}{6}$ times as long as broad, $1\frac{1}{6}$ times as long as postocular part of head; eye $4\frac{2}{3}$ times in length of head, a little more than $\frac{1}{2}$ interorbital width, nearly $\frac{3}{4}$ least depth of preorbital; mouth $\frac{7}{10}$ width of head, reaching to below nostril; scales on cheek in 3 rows, width of scaly part $1\frac{1}{4}$ times diameter of eye. Gill-rakers short, anvil-shaped, 9 on lower part of anterior arch.

Dorsal xvi 11; last spine longest, $\frac{2}{3}$ length of head; soft rays $\frac{2}{3}$ length of head. Pectoral a little longer than head, scarcely reaching vertical of origin of anal. Ventral not reaching vent. Anal iii 8; 3rd spine $\frac{1}{3}$ length of head. Caudal truncate, slightly emarginate; caudal peduncle $1\frac{1}{4}$ times as deep as long. Scales cycloid, $28\frac{1}{11}$; lateral lines $\frac{22}{12}$.

Colour (of preserved specimen) dark brown above, whitish beneath, scales dark at base; a dark opercular spot; dorsal with dark spots or streaks forming longitudinal lines; caudal with dark spots on upper lobe.

One specimen, 245 mm. in length, from Kafue River, Rhodesia (Mr. J. Drury).

17. *TILAPIA RUMSAYI*, n. sp.

Teeth in 3 rows, an outer series of large teeth followed by 2 inner rows of minute ones. Depth of body $3\frac{2}{5}$ times in total length excluding caudal, length of head $2\frac{1}{2}$ times. Head $2\frac{1}{5}$ times as long as broad;

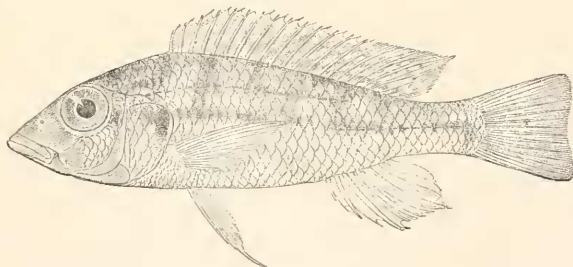


FIG. 129.—*Tilapia rumsayi*.

snout with straight upper profile, $1\frac{1}{4}$ times as long as broad, a little less than postocular part of head; eye $3\frac{1}{3}$ times in length of head; $1\frac{1}{2}$ times interorbital width, $1\frac{2}{3}$ times least depth of preorbital; mouth a little more than $\frac{1}{2}$ width of head, extending to between nostril and eye, lower jaw slightly projecting beyond upper; scales on cheek in 4 rows, width

of scaly part $\frac{3}{4}$ diameter of eye. Gill-rakers short, 10 on lower part of anterior arch.

Dorsal xiv 10; spines subequal from 6th; longest spine $\frac{2}{3}$ length of head; longest soft rays $\frac{1}{2}$ length of head. Pectoral $\frac{3}{4}$ length of head, reaching to vent. Ventral reaching to vent. Anal iii 6; 3rd spine $1\frac{1}{6}$ times as long as longest dorsal spine. Caudal truncate; caudal peduncle $1\frac{2}{3}$ times as long as deep. Scales cycloid, $29\frac{1}{2}$; lateral lines $\frac{2}{12}$.

Colour (of preserved specimen) light brown, darker above than below, faint cross-bars on body; an interrupted dark lateral band from eye to root of caudal; a shorter dark streak along upper lateral line to below posterior end of soft dorsal; a dark opercular spot; a faint dark bar from eye to angle of mouth and to chin; dorsal and caudal fins with dark and light spots.

One specimen, 61 mm. in length, from Victoria Falls, Zambesi River (F. Rumsay). Bulawayo Museum.

18. *TILAPIA SPARRMANI*, A. Smith.

Tilapia sparrmani, A. Smith, Ill. Zool. S. Afr., Pisces, pl. v (1849); Bouleng., Proc. Zool. Soc., 1899, p. 119, Pois. Bass. Congo., p. 462 (1901), Trans. Zool. Soc., xviii, 1911, p. 417, and Freshw. Fish. Africa, iii, p. 206, fig. 132 (1915); Pellegr. Mém. Soc. Zool. France, xvi, 1904, p. 319.

Chromis sparrmani, Günth., Cat. Fish., iv, p. 269 (1862).

Chromis niloticus, part., Peters, Reise Mossamb., iv, p. 23 (1868).

Tilapia fouloni, Bouleng., Ann. and Mag. Nat. Hist. (7), xvi, 1905, p. 647.

Teeth small, in 3 to 6 series, 40 (young) to 80 in outer series of upper jaw. Depth of body $2\frac{1}{4}$ to $2\frac{2}{3}$ times in total length excluding caudal, length of head 3 to $3\frac{1}{2}$ times. Head $1\frac{1}{3}$ to nearly twice as long as broad; snout with straight or slightly concave upper profile, a little broader than long, as long as or a little longer than eye, $\frac{3}{4}$ to $\frac{5}{8}$ postocular part of head; eye $3\frac{2}{5}$ to $4\frac{3}{10}$ times in length of head, $\frac{7}{10}$ to $\frac{9}{10}$ interorbital width, equal to or a little more than depth of preorbital; mouth moderate, $\frac{1}{2}$ to $\frac{2}{3}$ length of head, extending to between nostril and eye; 2 or 3 series of scales on the cheek, depth of scaly part $\frac{2}{3}$ to $\frac{5}{8}$ diameter of eye. Gill-rakers short, 9 to 12 on lower part of anterior arch.

Dorsal xiii-xv 9-11; last spine longest, $\frac{1}{2}$ to $\frac{3}{5}$ length of head; longest soft rays $\frac{2}{3}$ to $\frac{5}{8}$ length of head. Pectoral $\frac{3}{4}$ to nearly equal to length of head, not reaching anal. Ventral reaching to vent or to

origin of anal. Anal iii 8-10; 3rd spine a little shorter but stronger than last dorsal spine. Caudal rounded or subtruncate; caudal peduncle as long as deep or a little deeper than long. Scales cycloid, 27-29 $\frac{2\frac{1}{2}-3\frac{1}{2}}{9-11}$; lateral lines $\frac{16-19}{9-12}$.

Colour (of preserved specimens) light or reddish brown to dark olive brown, the scales sometimes with greenish-yellow margins; young with 7 to 9 dark cross-bars, which may persist, though feebly marked, in the adult; a blue-black opercular spot; dorsal, anal and caudal fins with dark spots or oblique dark and light stripes; a large blackish

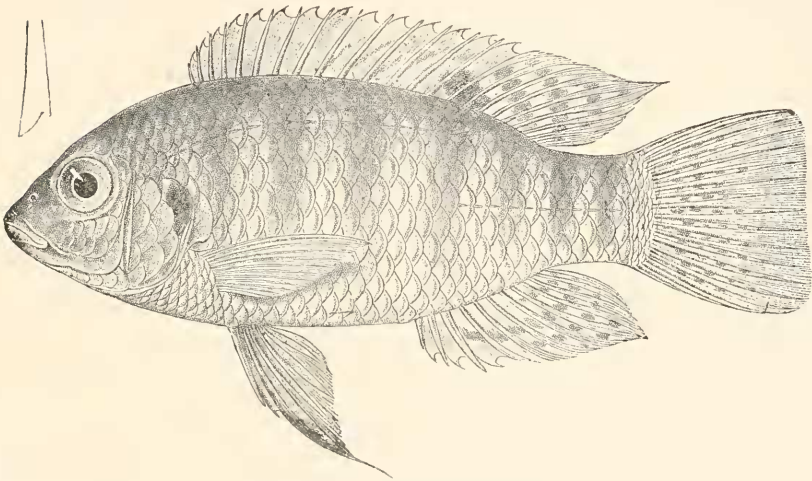


FIG. 130.—*Tilapia sparrmani*.

spot at base of soft dorsal between anterior rays; caudal sometimes with dark spots between the rays; outer ventral rays often darkish.

Two specimens, 98 mm., 108 mm. respectively, from Griqualand West (T. H. Orpen).

One specimen, 103 mm. in length, from a pool in Bulawayo, Rhodesia. Bulawayo Museum.

One specimen, 103 mm. in length, from Kafue River, Rhodesia.

One specimen, 38 mm. in length, from Dry Hartz River, Vryburg, Bechuanaland.

One specimen, 103 mm. in length, from Kuruman, Bechuanaland (R. Moffat).

Six specimens, ranging from 74-92 mm. in length, from Wondergat, near Mafeking.

Two specimens, 68 mm., 70 mm. in length respectively, from Nqametse River, Transvaal (Major J. Stevenson Hamilton).

One specimen, 48 mm. in length, from farm De Kroon, Limpopo or Crocodile River, Transvaal (H. Fry).

Five specimens, ranging from 57–81 mm. in length, from Klip River, Transvaal.

Two specimens, 67 mm., 78 mm. in length respectively, from Vereeniging, Transvaal (Mr. Leslie).

Two specimens, 85 mm., 98 mm. in length respectively, from Potchefstroom, Transvaal.

One specimen, 125 mm. in length, from Potchefstroom, Transvaal (Mr. Stenning).

Three specimens, ranging from 55–68 mm. in length, from Lydenberg District, Transvaal. Pretoria Museum.

Two specimens, 76 mm., 121 mm. in length respectively, from Six-miles Spruit, Pretoria District. Pretoria Museum.

One specimen, 86 mm. in length, from Aapjes River, Pretoria. Pretoria Museum.

Eleven specimens, ranging from 67–103 mm. in length, from Thabina and Letsikela Rivers, Transvaal. Pretoria Museum.

Thirteen specimens, ranging from 69–99 mm. in length, from Magalies River, Transvaal. Pretoria Museum.

One specimen, 112 mm. in length, from Pienaar's River, Transvaal. Pretoria Museum.

This species is also reported from Angola, Katanga, Lakes Mweru and Bangwelu, and Zambesi to Orange River and Natal.

19. *TILAPIA ELLENBERGERI*, n. sp.

Teeth in 2 series on upper jaw, about 60 in outer row, in 3 series on lower jaw. Depth of body a little more than $2\frac{1}{2}$ times in total length excluding caudal, length of head $2\frac{7}{10}$ times. Head nearly twice as long as broad; snout with convex upper profile, a little longer than broad, $\frac{5}{6}$ as long as postocular part of head; eye $4\frac{1}{4}$ times in length of head, a little less than interorbital width, equal to least depth of preorbital; mouth $\frac{3}{5}$ width of head, reaching to below nostril; scales on cheek in 3 or 4 rows, depth of scaly part $1\frac{1}{4}$ times diameter of eye. Gill-rakers short, broad, 9 on lower part of anterior arch.

Dorsal xiii 11; spines increasing in length to the last, which is $\frac{1}{3}$ length of head; longest soft rays $\frac{1}{2}$ length of head; posterior margin of both dorsal and anal fins rounded. Pectoral $\frac{3}{5}$ length of

head, scarcely reaching to vent. Ventral nearly $\frac{3}{5}$ length of head, reaching to vent. Anal iii 7; 3rd spine a little longer than longest dorsal spine. Caudal rounded; caudal peduncle as long as deep. Scales cycloid, $26\frac{5}{10}$; lateral lines $1\frac{9}{9}$.

Colour (of preserved specimen) dark brown above, yellowish beneath, with indistinct dark cross-bars on the body and an interrupted dark lateral band from eye to base of caudal, where it ends in a dark spot; soft dorsal covered with light spots in rows and with a narrow yellowish band or streak just within its outer edge running from its rounded posterior margin forward on to the posterior dorsal spines; anal with a row of 4 large, ocellar, whitish spots; caudal with small light and dark spots in transverse rows; a dark opercular spot, with a dark blotch below it; an indistinct dark bar from eye to angle of mouth.

One specimen, 74 mm. in length, from Lialui, Upper Zambesi (Rev. Ellenberger).

20. **TILAPIA OVALIS*, Steindr.

Chromis ovalis, Steindr., Verh. Zool.-bot. Ges. Wien., xvi, 1866, p. 761.

Tilapia ovalis, Bouleng., Proc. Zool. Soc., 1899, p. 119, Poiss. Bass. Congo., p. 461 (1901), and Freshw. Fish. Africa, iii, p. 208, fig. 133 (1915); Pellegr. Mém. Soc. Zool. France, xvi, 1904, p. 319.

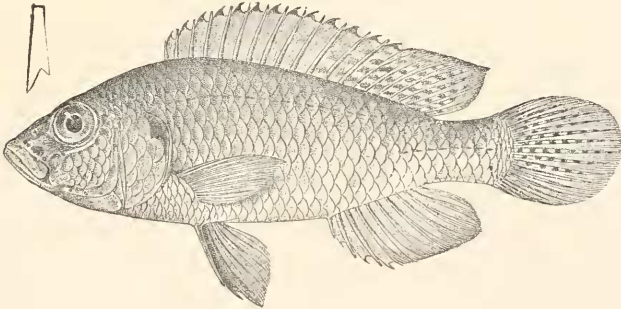


FIG. 131.—*Tilapia ovalis*.

“Depth of body equal to length of head, $2\frac{2}{3}$ to 3 times in total length. Head twice as long as broad, upper profile straight or curved; snout as long as broad, a little longer than eye, which is $3\frac{1}{2}$ (young) to 4 times in length of head, and slightly exceeds interorbital width or preorbital depth; mouth about $\frac{1}{2}$ width of head, extending to below anterior border of eye; teeth small, in 3 series, 40 to 50 in outer series

of upper jaw; 3 or 4 series of scales on the cheek, width of scaly part nearly equal to diameter of eye. Gill-rakers short, 7 to 9 on lower part of anterior arch.

Dorsal xiii-xv 9-11; last spine longest, $\frac{2}{5}$ to $\frac{1}{2}$ length of head; longest soft rays $\frac{1}{2}$ to $\frac{3}{5}$. Anal iii 8-9; 3rd spine as long as last dorsal. Pectoral shorter than head, not extending to vertical of origin of anal. Ventral reaching vent or anal. Caudal rounded. Caudal peduncle as long as deep. Scales cycloid or very finely denticulate, 27-30 $\frac{2\frac{1}{2}-3}{10}$; lateral lines $\frac{13-19}{1(\overline{2})-10}$.

Olive-brown, with or without faint darker vertical bars; a black opercular spot; dorsal and anal edged with black, and with dark and light spots, or with black streaks; outer ventral rays black or blackish.

Total length 100 millim.

Angola, Bechuanaland, Rhodesia, Katanga, Lake Bangweu."

21. **TILAPIA WOOSNAMI*, Blgr.

Bouleng., Trans. Zool. Soc., xviii, 1911, p. 417, pl. xliii, fig. 2; and Freshw. Fish. Africa, iii, p. 212, fig. 137 (1915).

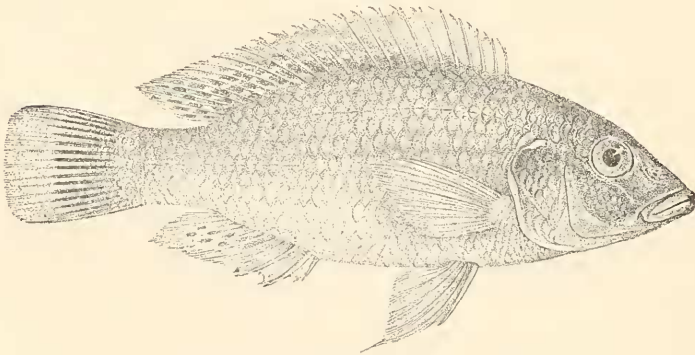


FIG. 132.—*Tilapia woosnami*. Type. $\frac{5}{6}$.

"Depth of body $2\frac{3}{4}$ times in total length, length of head 3 times. Head twice as long as broad; snout obtusely pointed, as long as post. orbital part of head, as long as broad, with slightly convex upper profile; eye $4\frac{1}{2}$ times in length of head, equal to width of interorbital region or depth of preorbital; mouth moderate, $\frac{3}{5}$ width of head—extending to between nostril and eye; teeth in outer row rather large,

36 in upper jaw, with an inner row of very minute teeth; 6 series of scales on the cheek, width of scaly part equal to diameter of eye. Gill-rakers very short, 12 on lower part of anterior arch.

Dorsal xv 13; spines equal in length from the seventh, which is $\frac{2}{5}$ length of head; longest soft rays $\frac{1}{2}$ length of head. Anal iii 9; 3rd spine nearly as long as longest dorsal. Pectoral $\frac{2}{3}$ length of head, not reaching vertical of origin of anal. Ventral barely reaching vent. Caudal rounded. Caudal peduncle as long as deep. Scales with feebly denticulated border, $34\frac{3\frac{1}{2}}{10}$; lateral lines $\frac{2}{16}$.

Brownish above, yellowish beneath; dorsal with round black spots between the soft rays.

Total length 110 millim."

From Lake Ngami Basin (Okovango River). (R. B. Woosnam).

22. *TILAPIA JALLAE, Blgr.

Chromis jallae, Bouleng., Boll. Mus. Torin., xi, 1896, p. 260.

Tilapia jallae, Bouleng., Proc. Zool. Soc., 1899, p. 123, and Freshw. Fish. Africa, iii, p. 213 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 329.

"Depth of body $3\frac{1}{2}$ times in total length, length of head $3\frac{1}{4}$ times. Snout a little longer than eye, which is $3\frac{1}{2}$ times in length of head and $1\frac{1}{2}$ times interorbital width; mouth not extending to below anterior border of eye; teeth small; 6 or 7 series of scales on the cheek. Gill-rakers short, 9 on lower part of anterior arch.

Dorsal xv 10; spines subequal from the fifth, which measures $\frac{1}{2}$ length of head; last soft rays prolonged into filaments. Anal iii 8; third spine as long as longest dorsal. Pectoral $\frac{2}{3}$ length of head. Caudal truncate. Caudal peduncle $1\frac{1}{2}$ times as long as deep. Scales cycloid, $33\frac{3}{8}$, lateral lines $\frac{2}{13}$.

Olive-brown, with traces of five darker bars.

Total length 75 millim.

Upper Zambesi (district of the Victoria Falls)."

23. *TILAPIA GIARDI, Pellegr.

Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 341, pl. v, fig. 2

Bouleng., Freshw. Fish. Africa, iii, p. 221, fig. 144 (1915).

"Depth of body equal to length of head, $2\frac{2}{3}$ times in total length. Upper profile of head curved; snout shorter than postocular part of head; eye $3\frac{1}{2}$ times in length of head; mouth $\frac{2}{5}$ width of head, extend-

ing nearly to below anterior border of eye; teeth in 3 series; 6 series of scales on the cheek. Gill-rakers short, 12 on lower part of anterior arch.

Dorsal xv 14; spines subequal from the fifth, a little less than $\frac{1}{2}$ length of head. Anal iii 9. Pectoral shorter (?) than head, not reaching anal. Caudal rounded (?). Caudal peduncle as long as deep. Scales feebly denticulate, $34\frac{13}{12}$, lateral lines $\frac{22}{13}$.

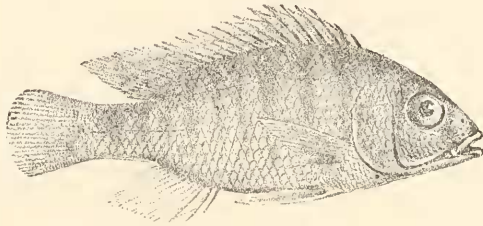


FIG. 133.—*Tilapia giardi*. Type.

Olive above, golden beneath; about 10 dark transverse bands; a dark opercular spot; soft dorsal with brownish dots.

Total length 78 millim.

Zambesi."

24. *TILAPIA CALLIPTERA*, Günth.

Chromis callipterus, Günth. Proc. Zool. Soc., 1893, p. 623, pl. iv, fig. B; Bouleng., *op. cit.*, 1896, p. 916.

Chromis subocularis, part., Günth., l.c. p. 621.

Otenochromis callipterus, Pfeff., Thierw. O.-Afr., Fische, p. 19 (1896).

Tilapia calliptera, Bouleng., Trans. Zool. Soc., xv, 1898, p. 4, Proc. Zool. Soc., 1899, p. 132, and Freshw. Fish. Africa, iii, p. 222, fig. 145 (1915); Pellegr., Mém. Soc. Zool. France, xv, 1904, p. 336.

Teeth in 3 or 4 series, outer larger, 40–60 in upper jaw; lateral teeth conical but passing generally into the bicuspid teeth. Depth of body $2\frac{2}{3}$ to $2\frac{3}{4}$ times in total length excluding caudal, length of head $2\frac{7}{10}$ to $2\frac{1}{2}$ times. Head twice as long as broad; snout rounded, with straight upper profile, as long as broad, shorter than postocular part of head; eye shorter than snout, 4 times in length of head, equal to or a little less than interorbital width, a little greater than least preorbital depth; width of mouth $\frac{2}{5}$ to $\frac{3}{5}$ width of head, extending to below anterior margin of eye, lower jaw projecting; 3 or 4 series

of scales on the cheek, width of scaly part equals diameter of eye. Gill-rakers short, 8 to 10 on lower part of anterior arch.

Dorsal xiv 9-10; last spine longest, $\frac{2}{3}$ length of head; longest soft rays $\frac{1}{2}$ to $\frac{3}{4}$ length of head. Pectoral $\frac{2}{3}$ to $\frac{3}{4}$ length of head, not reaching vertical of origin of anal. Ventral reaching to vent or nearly to origin of anal. Anal iii 7-8; 3rd spine as long as or a little shorter than last dorsal spine. Caudal rounded; caudal peduncle as long as deep. Scales finely denticulate, 27-33 $\frac{3-4}{11-12}$; lateral lines $\frac{19-20}{10-11}$.

Colour (of preserved specimens), brown or reddish-brown, with more or less distinct dark and light spots on dorsal and caudal fins; anal with a few large round white spots; a more or less distinct dark band from below the eye to the angle of the mouth; a dark opercular spot.

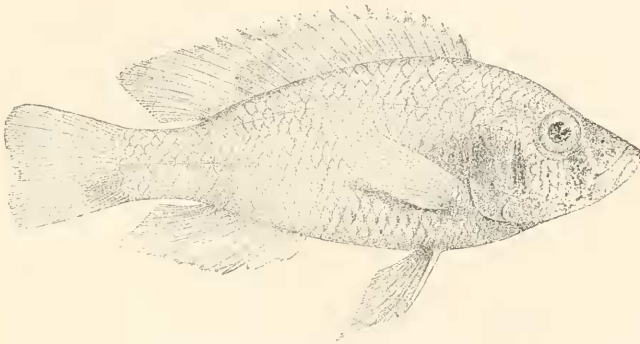


FIG. 134.—*Tilapia calliptera*. Type.

One specimen, 57 mm. in length, from Umgeni River, Natal.

One specimen, 63 mm. in length, from Kuruman, Bechuanaland (R. Moffat).

* 25. *TILAPIA LIVINGSTONII*, Blgr.

Bouleng., Proc. Zool. Soc., 1899, p. 134, pl. xi, fig. 2, and Freshw. Fish. Africa, iii, p. 243, fig. 162 (1915); Pellegr. Mém. Soc. Zool. France, xvi, 1904, p. 341.

“Depth of body scarcely greater than length of head, 3 times in total length. Head twice as long as broad, upper profile forming a strong curve; snout broader than long, shorter than postocular part of head, as long as eye, which is $3\frac{1}{2}$ times in length of head and slightly exceeds interorbital width or least depth of praeorbital;

mouth moderately large, $\frac{3}{4}$ width of head, extending to below anterior border of eye; teeth in 6 series, outer moderately large, 40 in upper jaw; 3 or 4 series of scales on the cheek, width of scaly part less than diameter of eye. Gill-rakers short, 8 on lower part of anterior arch.

Dorsal xvii 9; last spine longest, not quite $\frac{1}{2}$ length of head, $\frac{2}{3}$ longest soft rays. Anal iii 8; 3rd spine a little shorter than last dorsal. Pectoral $\frac{3}{4}$ length of head, not extending to origin of anal. Ventral reaching origin of anal. Caudal rounded. Caudal peduncle as long as deep. Scales strongly denticulate, 33 $\frac{5-6}{12}$; lateral lines $\frac{22-23}{11-12}$.

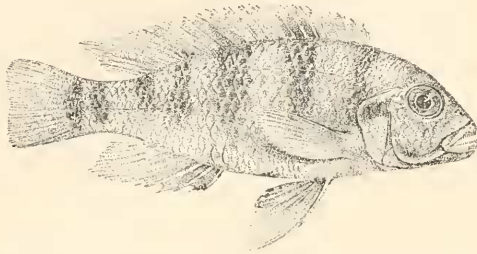


FIG. 135.—*Tilapia livingstoni*. Type (P.Z.S., 1899).

Brownish above, with 7 dark bars, the first on the nape, the penultimate on the caudal peduncle, the last at the root of the caudal fin; two round white spots on the anal fin.

Total length 73 millim.

Zambesi (?)."

26. *TILAPIA KIRKHAMI*, n. sp.

Teeth in 4 series, an outer of larger bicuspid teeth, about 50 in number on upper jaw, separated by a narrow interspace from 3 rows of tricuspid teeth. Depth of body $2\frac{1}{2}$ times in total length excluding caudal, length of head $3\frac{1}{10}$ times. Head with an obtusely rounded profile, $1\frac{2}{3}$ times as long as broad; snout with straight upper profile, $1\frac{1}{3}$ times as long as broad, a little longer than postocular part of head; eye $4\frac{7}{10}$ times in length of head, $\frac{3}{5}$ interorbital width, $\frac{4}{5}$ least depth of preorbital; mouth $\frac{4}{5}$ width of head, reaching scarcely to vertical of anterior border of eye; 3 to 4 series of scales on cheek, width of scaly part $1\frac{1}{5}$ times diameter of eye. Gill-rakers short, 8 on lower part of anterior arch.

Dorsal xvi 11; spines weak, increasing in length to the last, which is nearly $\frac{1}{2}$ length of head; soft rays slightly produced, $\frac{9}{10}$ length of head. Pectoral $\frac{9}{10}$ length of head, not reaching anal. Ventral reaching scarcely to vent. Anal iii 10; 3rd spine $\frac{3}{10}$ length of head; soft rays produced as long as head. Caudal rounded-subtruncate; caudal peduncle $1\frac{1}{4}$ times as deep as long. Scales rugose, feebly pectinate, $30\frac{3}{11}$; lateral lines $\frac{21}{14}$.

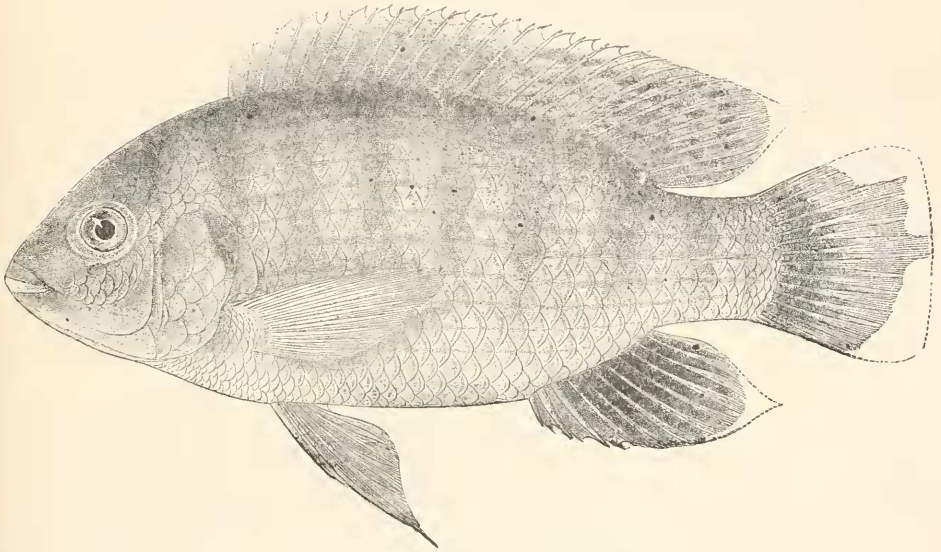


FIG. 136.—*Tetapia kirkhami*, $\frac{3}{4}$.

Colour (of preserved specimen), dark brown above, a little lighter on the belly, scales with a dark curved bar on outer half and a white outer margin; opercular spot very indistinct; indistinct dark cross-bars on body; faint dark spots or bars on soft dorsal, with a very indistinct dark spot at base of anterior rays and a faint light tip to the rays; gill-membranes blackish.

One specimen, 181 mm. in length, from Lake Ngami (Mr. H. F. Kirkham).

PETROCHROMIS.

Bouleng., Trans. Zool. Soc., xv, 1898, p. 20, Poiss., Bass. Congo, p. 479 (1901), Fish. Nile, p. 535 (1907), and Freshw. Fish. Africa, iii, p. 267 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 350.

“Barely separable from *Tilapia*, differing only in the broader bands of teeth in the jaws, showing when the mouth is closed, the teeth being all very slender with expanded tricuspid crowns bent inwards and disposed very regularly.” (In a footnote Dr. Boulenger points out that “as in *Tilapia*, the teeth are much more numerous and form broader bands in the adults than in the young. Thus, in *P. tanganyicæ* the transverse series vary with age from 5 to 12, the outer series containing 58–100 teeth.”) Vertebrae 31–32.

Great Lakes of Africa.

PETROCHROMIS ANDERSONII, Blgr.

Bouleng., Ann. & Mag. Nat. Hist. (7), viii, 1901, p. 13, Fish. Nile, p. 535, pl. xcvi (1907), and Freshw. Fish. Africa, iii, p. 269, fig. 183 (1915); Pellegr. Mém. Soc. Zool. France, xvi, 1904, p. 351.

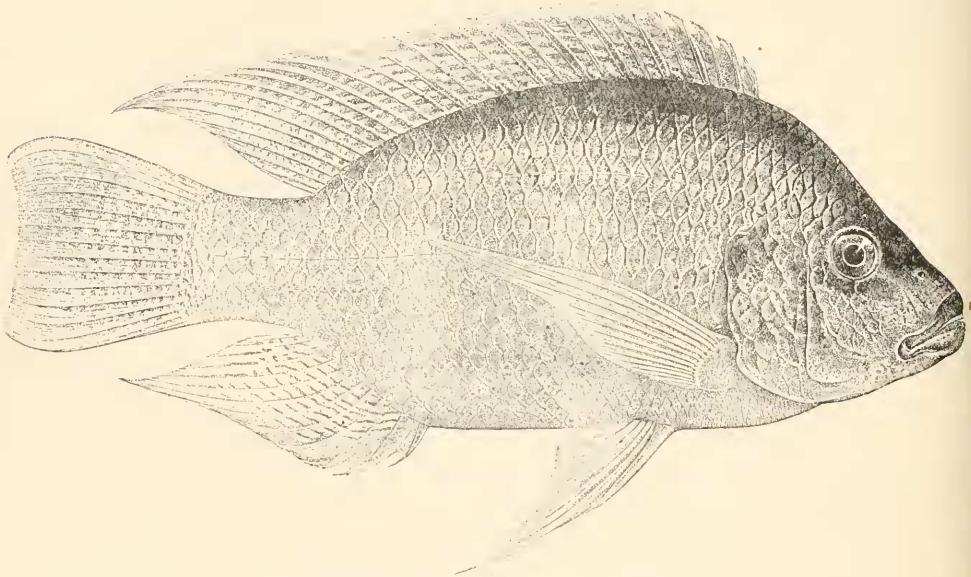


FIG. 137.—*Petrochromis andersonii*. Type. $\frac{2}{7}$.

Teeth in a broad band anteriorly, diminishing in width as it passes backwards on the jaws. Depth of body $2\frac{1}{6}$ times in total length excluding caudal, length of head nearly 3 times. Head not quite twice as long as broad; snout as long as broad, $2\frac{3}{8}$ times as long as eye, which is six times in length of head and $2\frac{1}{4}$ times in interorbital

width; mouth with thick lips, extending to between nostril and eye; scales on cheek in 2 series, width of scaly part equals diameter of eye. Gill-rakers short, 25 on lower part of anterior arch.

Dorsal xvi 13; spines strong, increasing in length to the last, which is $\frac{2}{5}$ length of head; longest soft rays a little shorter than head. Pectoral longer than head, reaching slightly beyond origin of anal. Ventral reaching anal. Anal iii 11; 3rd spine a little shorter than last dorsal spine. Caudal truncate? (broken in specimen), caudal peduncle $1\frac{2}{5}$ as deep as long. Scales not denticulate, $33\frac{4}{5}$; lateral lines $\frac{2}{1}\frac{1}{5}$.

Colour (of preserved specimen), dark olive brown above, yellowish below, scales with dark centre; a black opercular spot; dorsal and anal with dark spots or streaks, outer $\frac{3}{5}$ of soft dorsal light-coloured; outer rays of ventral blackish; gular and pectoral regions blackish.

One specimen, 279 mm. in length, from Bulawayo Museum.

The above specimen does not quite agree with Dr. Boulenger's description of *P. andersonii*, as there are only 2 series of scales on the cheek, the snout appears to be proportionately shorter and the eye smaller.

HAPLOCHROMIS.

Haplochromis, Pfeff., Sitzb. Ges. naturf. Fr. Berlin, 1888, p. 76; Bouleng., Fishes Nile, p. 495 (1907), and Freshw. Fish. Afr., iii, p. 284 (1915).

Ctenochromis, part., Pfeff., Jahrb. Hamb. Wiss. Anst., z, 1893, p. 149, and Thierw. O.-Afr., Fische, p. 14 (1896).

Paratilapia, part., Bouleng., Proc. Zool. Soc., 1898, p. 137, and Poiss. Bass. Congo, p. 412 (1901).

Tilapia, part., Bouleng. Proc. Zool. Soc., 1899, p. 105, and Poiss. Bass. Congo, p. 452.

Astatotilapia, Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 299.

Astatoreochromis, Pellegr., t.c., p. 384.

“Body short or moderately elongate; scales ctenoid; two incomplete lateral lines. Teeth in two or more series, the outer conical or bicuspid, the inner usually tricuspid; maxillary bone exposed at the end when the mouth is closed. Dorsal fin with 13 to 19 spines, anal with 3 to 6. Vertebrae 28-32.

Africa and Syria.

Under this genus are grouped a number of allied species which vary to such an extent in their dentition that some specimens might be referred to *Tilapia* and others to *Paratilapia*.”

HAPLOCHROMIS MOFFATI, Cast.

Chronys moffati, Cast., Mém. Poiss. Afr. Austr., p. 16 (1861).

Chronis (Ctenochromis) philander, M. Weber, Zool. Jahrb. Syst., x, 1897, p. 148.

Paratilapia moffati, Bouleng., Proc. Zool. Soc., 1898, p. 140; Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 259.

Tilapia philander, Bouleng., Proc. Zool. Soc., 1899, p. 136; Peliegr., t.c., p. 340.

Haplochromis moffati, Bouleng., Fish. Nile, 504 (1907), Trans. Zool. Soc., xviii, 1911, p. 415, and Freshw. Fish. Africa, iii, p. 300, fig. 204 (1915); Schreitmüller, Bl. Aq. Terr. K., xxiii, 1912, p. 724, fig.

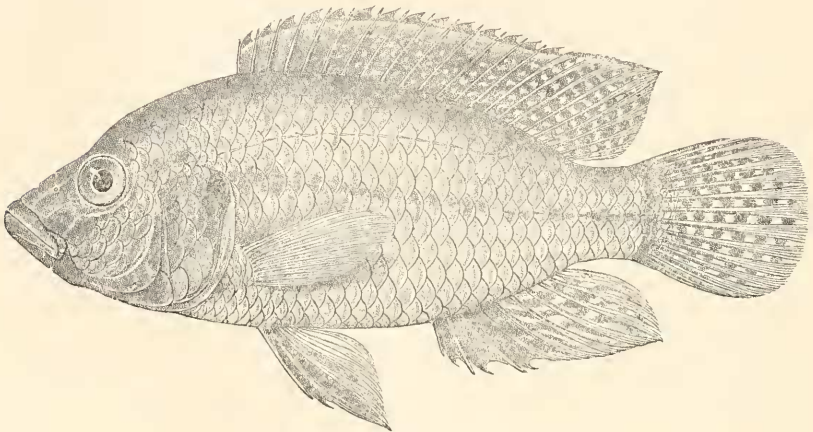


FIG. 138.—*Haplochromis moffati*.

Teeth in three or four series, outer larger and conical or more or less distinctly bicuspid, inner usually tricuspid, sometimes conical. Depth of body equal to or a little less than length of head, which is $2\frac{1}{2}$ to 3 times in total length excluding caudal. Snout with straight or slightly convex upper profile, longer than eye, which is $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of head and equals or is slightly greater than interorbital width; maxillary extending to below nostril or between nostril and eye; 3 or 4 series of scales on the cheek, depth of scaly part equal to or a little less or a little more than diameter of eye. Gill-rakers short, 8 to 10 on lower part of anterior arch.

Dorsal xiii-xiv (rarely xv) 9-11; spines subequal or increasing in length posteriorly, the last $\frac{1}{3}$ to $\frac{2}{5}$ length of head; longest soft rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Pectoral $\frac{3}{5}$ to $\frac{3}{4}$ length of head, not reaching

vertical of origin of anal. Ventral reaching vent or origin of anal. Anal iii 8-9; 3rd spine as long as or a little shorter than longest dorsal spine. Caudal rounded; caudal peduncle as long as or slightly longer than deep. Scales denticulate, 26-30 $\frac{3-4}{10-11}$; lateral lines $\frac{15-19}{6-11}$.

Colour (of preserved specimens), olive or brownish, darker above than below, with or without ill-defined darker cross-bars, and with or without an interrupted indistinct dark lateral band; a dark opercular spot; sometimes a dark bar below the eye; spinous dorsal black-edged at least anteriorly; soft dorsal, anal and caudal with small light and dark spots.

One specimen, 85 mm. in length, from Umkomas River, Natal (Dr. Gilchrist).

Three specimens, ranging from 25-42 mm. in length, from Dry Hartz River, Vryburg (Mr. J. W. Jones).

Four specimens, ranging from 53-66 mm. in length, from Kuruman, Bechuanaland.

Five specimens, ranging from 55-71 mm. in length, from Wondergat, near Mafeking.

Two specimens, 46 mm., 53 mm. in length respectively, from Pretoria.

Twenty-nine specimens, ranging from 32-75 mm. in length, from Zoological Gardens, Pretoria.

Three specimens, ranging from 49-62 mm. in length, from Sabi River, Transvaal (Major J. Stevenson Hamilton).

Three specimens, ranging from 47-57 mm. in length, from Potchefstroom, Transvaal.

One specimen, 40 mm. in length, from Molopo River, Transvaal.

This species is also reported from the upper tributaries of the Congo (Katanga), Zululand, Lake Ngami, Rhodesia, and Mozambique.

HAPLOCHROMIS DESFONTAINESII, Lacep.

Labrus desfontainesii, Lacep., Hist. Nat. Poiss., iv, pp. 54, 160 (1802).

Sparus? desfontainesii, Gerv., Zool. Pal. Gén., p. 208, pl. xlv, fig. 4 (1869).

Chromis desfontainesii, Sauv., Bull. Soc. Philom. (7), i, 1877, p. 160; Vincig., Ann. Mus. Genova, xx, 1884, p. 429; Rolland, Rev. Scientif. (4), ii, 1894, p. 418, fig.

Hemichromis bloyeti, Sauv., Bull. Soc. Philom. (7), viii, 1883, p. 159.

Chromis flavii-josephi, Lortet, Arch. Mus. Lyon, iii, 1883, p. 141, pl. viii, fig. 2.

Hemichromis giglioli, Pfeff., Thierw. O.-Afr., Fische, p. 24 (1896).

Paratilapia blozeti, Bouleng., Proc. Zool. Soc., 1898, p. 143, and Poiss. Bass. Congo, p. 418 (1901).

Tilapia desfontainesii, Bouleng., Proc. Zool. Soc., 1899, p. 135, pl. xi, fig. 3.

Tilapia flavii-josephi, Bouleng., l.c.

Paratilapia wingatii, Bouleng., Ann. and Mag. Nat. Hist. (7), x, 1902, p. 264.

Astatotilapia desfontainesii, Pellegr. Mém. Soc. Zool. France, xvi, 1904, p. 300, and xxii, 1910, p. 291.

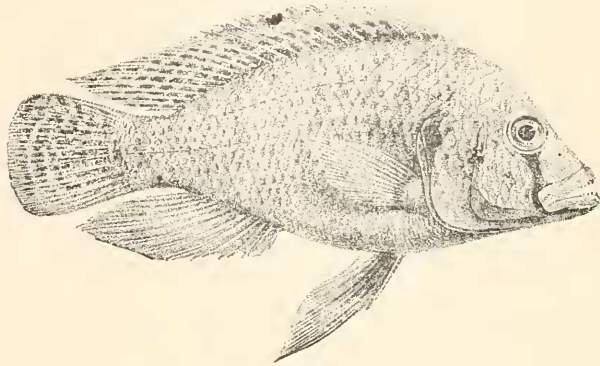


FIG. 139.—*Haplochromis desfontainesii*.

Tilapia (Ctenochromis) sparsidens, Hilgendorf, Zool. Jahrb., Syst., xxii, 1905, p. 408.

Haplochromis desfontainesii, Bouleng., Fish. Nile, p. 501, pl. xc, fig. 3 (1907), and Ann. Mus. Genova (3), v, 1911, p. 71, and Freshw. Fish. Africa, iii, p. 302, fig. 205 (1915).

Teeth, outer large, conical or more or less distinctly bicuspid in the adult, usually bicuspid in the young, 30-60 in upper jaw, followed by two or three series of small tricuspid teeth. Depth of body $2\frac{1}{2}$ to $3\frac{1}{4}$ times in total length excluding caudal, length of head $2\frac{3}{5}$ to 3 times. Head $1\frac{1}{3}$ to twice as long as broad; snout with straight or slightly concave upper profile, 1 to $1\frac{1}{2}$ times diameter of eye, which is 3 to $4\frac{1}{2}$ times in length of head and equals or slightly exceeds interorbital width; least depth of preorbital $\frac{2}{3}$ to once diameter of eye; jaws

equal in front or lower slightly projecting; maxillary extending to below anterior border of eye; 3 to 5 series of scales on the cheek, width of scaly part nearly equal to or slightly greater than diameter of eye. Gill-rakers very short, 8 to 10 on lower part of anterior arch.

Dorsal xiv-xvi (rarely xiii) 9-10 (rarely 8, 11, or 12); spines subequal from 10th or increasing in length to the last, which is $\frac{2}{5}$ to $\frac{3}{5}$ length of head; longest soft rays $\frac{1}{3}$ to over $\frac{2}{3}$ length of head. Pectoral $\frac{3}{5}$ to $\frac{1}{5}$ length of head, not reaching vertical of origin of anal. Ventral reaching vent, sometimes to origin of anal or beyond. Anal iii-iv 7-10; 3rd spine as long as or a little shorter than last dorsal spine. Caudal rounded; caudal peduncle as long as or a little longer than deep. Scales strongly denticulate, 27-33 $\frac{3-4}{10-12}$; lateral lines $\frac{17-22}{7-13}$.

Colour (of preserved specimens), brownish or olive, with or without indistinct dark cross-bars, with an interrupted dark lateral band from eye to root of caudal fin and in some a narrower band on upper lateral line; a more or less distinct dark bar from eye to angle of mouth; vertical fins with or without more or less distinct dark and light spots, anal often with light ocelli and dorsal often black-edged. Some specimens entirely dark brown.

Three specimens, ranging 47-70 mm. in length, from Livingstone, Rhodesia (A. Stevenson).

One specimen, 56 mm. in length, from Little Olifants River, Middleburg, Transvaal.

Seven specimens, ranging from 36-51 mm. in length, from Potchefstroom, Transvaal.

This species is also reported from the Northern border of the Sahara and Syria to Lakes Victoria and Tanganyika, and German East Africa.

PARATILAPIA, Bleek.

Paratilapia, Bleeker, Verh. Ak. Amsterd., ii, 1868, p. 307; Bouleng., Proc. Zool. Soc., 1898, p. 137 (part.), Poiss. Bass. Congo, p. 412 (1901), Fish. Nile, p. 466 (1907), and Freshw. Fish. Africa, iii, p. 308 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 256.

Paracara, Bleek., Versl. Ak. Amsterd., xii, 1878, p. 193.

Haplotilapia, Hilgendl., Sitzb. Ges. nat. Fr. Berl., 1888, p. 77.

Hemichromis, part., Pfeff., Thierw. O.-Afr., Fische, p. 19 (1896).

Boulengerochromis, Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 304.

“Body short or more or less elongate; scales cycloid or ctenoid; two lateral lines both incomplete, or the upper nearly complete. Two or more series of teeth, the outer conical and sometimes canine-like in the adult, sometimes bicuspid in the young, the others unicuspid or tricuspid; maxillary usually exposed when the mouth is closed. Dorsal with 10 to 18 spines, anal with 3. Parietal and occipital crests strong, extending to between the orbits. Vertebrae 27–37.

Africa and Syria.”

Synopsis of the South African Species described.

7 to 14 gill-rakers on lower part of anterior arch; less than 50 scales in longitudinal series on the body.

A. Premaxillary process very long, extending to between the orbits; caudal rounded or truncate.

1. Width of head not more than $2\frac{2}{3}$ times in its length.

(a) Pectoral at least nearly as long as head.

D. xv 13; A. iii, 9–10; Sc. 34–37 $\frac{4-11}{11}$; 5 or

6 series of scales on the cheek 1. *P. longimanus*, Blgr.

D. xiv 11; A. iii 7; Sc. 31 $\frac{31}{9}$; 5 series of

scales on the cheek; pectoral $\frac{1}{2}$ length of head 2. *P. arnoldi*, n. sp.

(b) Pectoral much shorter than head.

D. xv 14; A. iii 9–10; Sc. 33–35 $\frac{7}{11-12}$; 8–9

series of scales on the cheek; pectoral $\frac{2}{3}$ length of head 3. *P. ellenbergeri*, n. sp.

D. xvi 14; A. iii 10; Sc. 36 $\frac{6\frac{1}{2}}{13}$; 8 series of

scales on the cheek; pectoral $\frac{3}{5}$ length of head 4. *P. zambesensis*, n. sp.

2. Width of head $2\frac{1}{3}$ to 3 times in its length; pectoral shorter than head.

D. xiv–xvi 14–16; A. iii 10–13; Sc. 36–39

$\frac{5-7}{12-18}$; lower jaw projecting; 7–10 series of scales on the cheek; caudal peduncle as long as or a little longer than deep 5. *P. angusticeps*, Blgr.

B. Premaxillary processes not extending to between the orbits; caudal rounded, truncate, or slightly emarginate, not scaly.

1. Pharyngeal teeth all slender.

Snout considerably longer than the eye in the adult; depth of body $2\frac{2}{3}$ to $4\frac{1}{2}$ times in total length.

Caudal peduncle as long as deep, or slightly longer than deep; head 2 to $2\frac{1}{2}$ times as long as broad.

6 to 9 series of scales on the cheek.

- D. xv-xviii 13-16; A. iii 10-12; Sc. 35-41
 $\frac{4\frac{1}{2}-5\frac{1}{2}}{12-15}$; 7 to 9 series of scales on the
 cheek 6. *P. thumbergii*, Cast.
2. Some of the pharyngeal teeth with spherical crowns; depth of body
 2 to $2\frac{2}{3}$ times in total length; caudal rounded or subtruncate.
- (a) Snout shorter than postocular part of head; 4 or 5 series of scales
 on the cheek.
- D. xiv-xv 14-15; A. iii 10; Sc. 35-36 $\frac{4}{12}$.
 cycloid; pectoral shorter than head;
 caudal peduncle much deeper than
 long 7. *P. codringtoni*, Blgr.
- D. xv 12-13; A. iii 9-10; Sc. 33-34 $\frac{4}{11}$, finely
 denticulate; pectoral shorter than
 head; caudal peduncle as long as deep
 or slightly deeper than long 8. *P. carlotthae*, Blgr.
- D. xiv-xv 12-13; A. iii 10; Sc. 30-33 $\frac{3\frac{1}{2}-4}{10-11}$.
 cycloid; pectoral as long as head;
 caudal peduncle as long as deep or a
 little deeper than long 9. *P. gibbiceps*, Blgr.
- D. xvi 13; A. iii 9-10; Sc. 33-35 $\frac{6}{12}$.
 pectoral shorter than head; caudal
 peduncle deeper than long 10. *P. marginata*, n. sp.
- (b) Snout at least as long as postocular part of head; pectoral shorter
 than head; caudal peduncle as long as deep or a little deeper
 than long.
- D. xv 13-14; A. iii 8-9; Sc. 32-34 $\frac{3\frac{3}{4}}{11}$; eye
 5 to $5\frac{1}{2}$ times in head; 50 to 60 teeth in
 outer series of upper jaw 11. *P. frederici*, Cast.
- D. xiv-xv 12-13; A. iii 8-9; Sc. 33-34 $\frac{3\frac{1}{2}}{10-11}$;
 eye 4 to $4\frac{1}{2}$ times in length of head;
 52 to 64 teeth in outer series of upper
 jaw 12. *P. smithii*, Cast.
- D. xv-xvi 12-14; A. iii 8-10; Sc. 32-37
 $\frac{3\frac{1}{2}-4\frac{1}{2}}{11-13}$; eye $3\frac{1}{2}$ to $4\frac{1}{2}$ times in length of
 head; 36-50 teeth in outer series of
 upper jaw 13. *P. mellandi*, Blgr.

1. PARATILAPIA LONGIMANUS, Blgr.

Bouleng., Trans. Zool. Soc., xviii, 1911, p. 411, pl. xl, and Freshw.
 Fish. Africa, iii, p. 319, fig. 212 (1915).

Teeth small, in 2 or 3 series, 52-60 in outer series of upper

jaw. Depth of body $2\frac{2}{3}$ times in total length excluding caudal, length of head $2\frac{2}{3}$ times. Head $2\frac{1}{3}$ times as long as broad, upper profile slightly concave; lower jaw slightly projecting beyond upper; snout obtusely pointed, slightly longer than broad, shorter than postocular part of head; eye $4\frac{1}{2}$ times in length of head, equal to interorbital width or preorbital depth; mouth very protractile, extending to below anterior border of eye; premaxillary processes very long, extending to between the eyes; 6 series of scales on the cheek, width of scaly part a little greater than diameter of eye. Gill-rakers short, posterior T-shaped, 11 on lower part of anterior arch.

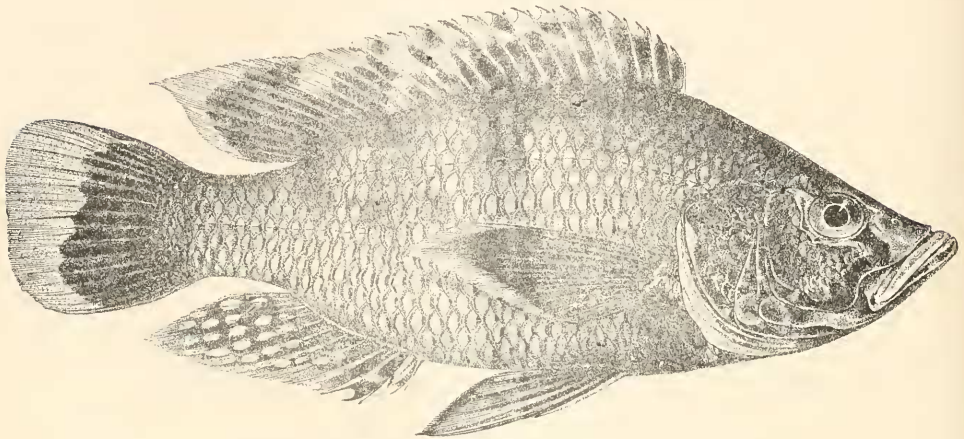


FIG. 140.—*Paratilapia longimanus*. Type. $\frac{1}{2}$.

Dorsal xv 13; spines increasing in length to the last, which is $\frac{2}{5}$ length of head; longest soft rays $\frac{3}{5}$ length of head. Pectoral nearly as long as head, reaching beyond vertical of origin of anal. Ventral scarcely reaching anal. Anal iii 10; 3rd spine $\frac{1}{3}$ length of head. Caudal rounded; caudal peduncle as long as deep. Scales not or but very indistinctly denticulate, $34\frac{5}{11}$; lateral lines $\frac{2\frac{2}{3}}$.

Colour (of preserved specimen), olive-brown, yellowish beneath, with ill-defined or irregular darker cross-bands; vertical fins brown, with round darker spots; pectorals dark olive; a dark opercular spot.

One specimen, 143 mm. in length, from Victoria Falls, Zambesi River (G. Arnold). Bulawayo Museum.

One specimen, 245 mm. in length, from the same locality, received from Mr. F. W. Sykes, apparently belongs to this species, but the condition of the fish is too unsatisfactory for determination.

2. *PARATILAPIA ARNOLDI*, n. sp.

Teeth, an outer row of sharp conical teeth, 60 on upper jaw, followed by 2 rows of small teeth. Depth of body equals length of head and is about 3 times in total length excluding caudal. Head a little more than twice as long as broad; snout with straight upper profile, a little longer than broad, a little shorter than postocular part of head; eye 4 times in length of head, $1\frac{1}{7}$ times interorbital width, about equal to least depth of preorbital; premaxillary processes long, extending to between the eyes; lips thick; mouth about $\frac{2}{3}$ width of head, reaching to between nostril and eye; 5 series of scales on the cheek, depth of scaly part $1\frac{1}{8}$ times diameter of eye. Gill-rakers short, stout, 10 on lower part of anterior arch.

Dorsal xiv 11; last spine longest, a little more than $\frac{2}{5}$ length of head; longest soft rays $\frac{7}{10}$ length of head. Pectoral $\frac{4}{5}$ length of head, reaching to vent. Ventral $\frac{7}{10}$ length of head, reaching to vent. Anal iii 7; 3rd spine slightly shorter than longest dorsal spine. Caudal truncate; caudal peduncle $1\frac{1}{2}$ times as long as deep. Scales cycloid, $31\frac{33}{9}$; lateral lines $\frac{20}{14}$.

Colour (of preserved specimen) brown, dark above, yellowish beneath, about 7 indistinct cross-bars; a dark opercular spot; soft dorsal and caudal with light and dark spots in rows; outer rays of ventral dark; a dark brown bar from lower anterior angle of eye to angle of mouth and continued beneath; chin black, a dark blotch on occiput above upper posterior angle of each eye.

One specimen, 95 mm. in length, from Mazoe River, Rhodesia (Mr. G. Arnold).

3. *PARATILAPIA ELLENBERGERI*, n. sp.

Teeth in 2 rows, about 60 in outer series on upper jaw. Depth of body $2\frac{3}{4}$ to 3 times in total length excluding caudal, length of head $2\frac{2}{3}$ to 3 times. Head twice as long as broad, with straight or slightly concave upper profile; snout as long as broad, pointed, $\frac{2}{3}$ to $\frac{3}{4}$ length of postocular part of head; eye $4\frac{3}{4}$ to $5\frac{1}{10}$ times in length of head, equal to or a little less than interorbital width, a little greater than preorbital depth; mouth $\frac{3}{4}$ to $\frac{4}{5}$ width of head, extending to anterior margin of eye, very protractile; lower jaw projecting; premaxillary processes long, extending to between the eyes; 8 to 9 series of scales on the cheek, depth of scaly part $1\frac{1}{3}$ to $1\frac{2}{3}$ diameter of eye. Gill-rakers short, 11 to 12 on lower part of anterior arch.

Dorsal xv 14; last spine longest, nearly $\frac{2}{3}$ length of head; longest soft rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Pectoral $\frac{3}{5}$ to $\frac{7}{10}$ length of head, reaching or nearly reaching vent. Ventral $\frac{3}{5}$ length of head, reaching to vent. Anal iii 9-10, 3rd spine a little shorter than longest dorsal spine. Caudal rounded; caudal peduncle $1\frac{1}{6}$ to $1\frac{3}{10}$ times as long as deep. Scales cycloid, 33-33 $\frac{7}{11-12}$; lateral lines $\frac{23}{14}$ - $\frac{25}{16}$.

Colour (of preserved specimens) olive-brown above, yellowish below; dark cross-bars on body and a dark lateral band; a dark opercular spot; dorsal with light spots; anal with dark oval spots between the rays; caudal with light spots; ventrals dark.

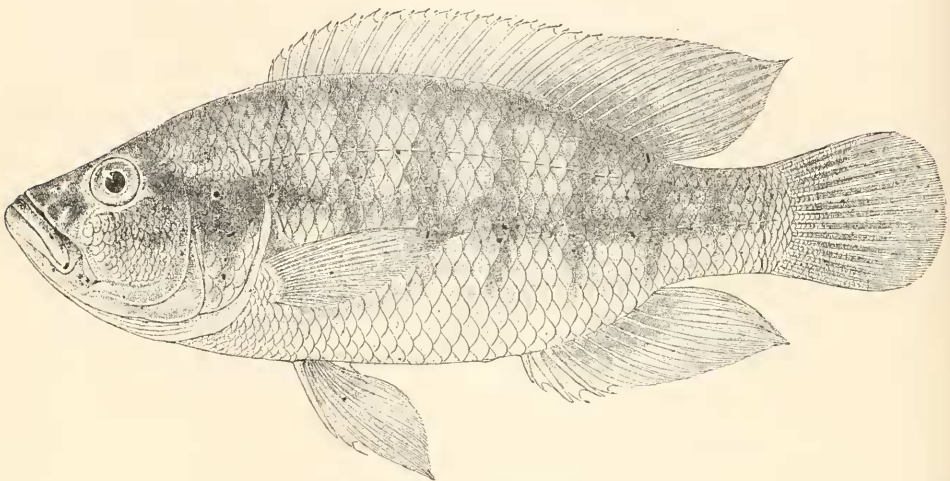


FIG. 141.—*Paratilapia ellenbergeri*.

Two specimens, 106 mm. and 130 mm. in length respectively, from Lialui, Upper Zambesi (Rev. Ellenberger).

One specimen, 213 mm. in length, from Shesheke, Southern Rhodesia (Rev. L. Jalla).

This species closely resembles *P. angusticeps* and seems to be intermediate between it and *P. longimanus*.

4. PARATILAPIA ZAMBESENSIS, n. sp.

Teeth small, in 3 series, 50 (circa) in outer row on the upper jaw, followed by 2 short irregular rows of slightly smaller teeth. Depth of body $2\frac{2}{5}$ times in total length excluding caudal, length of head $2\frac{1}{5}$ times. Head twice as long as] broad, upper profile convex, with a depression

before the eyes; snout rounded, $1\frac{1}{5}$ times as long as broad, a little more than $\frac{3}{4}$ length of postocular part of head; eye $6\frac{3}{10}$ times in length of head, $1\frac{4}{5}$ times in interorbital width, $\frac{2}{3}$ preorbital depth; mouth protractile, reaching to a little beyond vertical of anterior border of eye, lower lip projecting; premaxillary processes long, reaching to between the eyes; 8 series of scales on the cheek, depth of scaly part $2\frac{1}{3}$ times diameter of eye. Gill-rakers short and thick, bifid and trifid near angle, 12 on lower part of anterior arch.

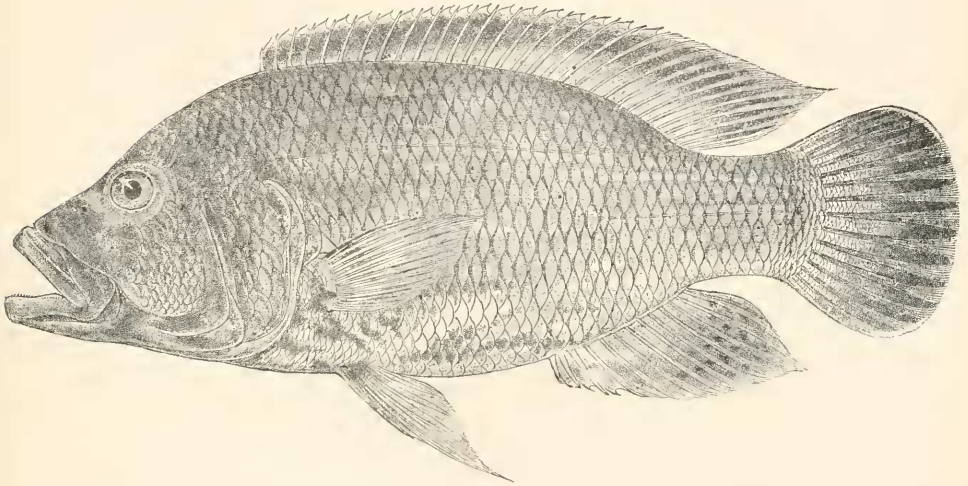


FIG. 142.—*Paratilapia zambesensis*. $\frac{5}{13}$.

Dorsal xvi 14; spines strong and increasing in length to the last, which is about $\frac{3}{10}$ length of head; longest soft rays $\frac{3}{5}$ length of head. Pectoral $\frac{3}{5}$ length of head, reaching to vent. Ventral nearly $\frac{4}{5}$ length of head, reaching to origin of anal. Anal iii 10; 3rd spine $\frac{3}{4}$ length of longest dorsal spine. Caudal rounded, caudal peduncle $1\frac{1}{4}$ times as deep as long. Scales cycloid, $36\frac{6}{13}$; lateral lines $\frac{2}{5}$.

Colour (of preserved specimen) dark olive-brown, scales dark at the base; a dark blotch on body before origin of anal; an indistinct dark opercular spot; soft dorsal with light spots; anal with dark ocellated spots; dorsal fin and lobes of caudal tipped with orange.

One specimen, 325 mm. in length, from Zambesi River. Bulawayo Museum.

5. PARATILAPIA ANGUSTICEPS, Blgr.

? *Chromys lecaillantii*, Casteln., Mém. Poiss. Afr. Austr., p. 16, (1861).

Paratilapia angusticeps, Bouleng., Ann. and Mag. Nat. Hist. (7), xx, 1907, p. 108, Trans. Zool. Soc., xviii, 1911, p. 414, pl. xlii, and Freshw. Fish. Africa, iii, p. 320, figs. 213 and 214 (1915).

Paratilapia kafuensis, Bouleng., Ann. and Mag. Nat. Hist. (8), ii, 1908, p. 494.

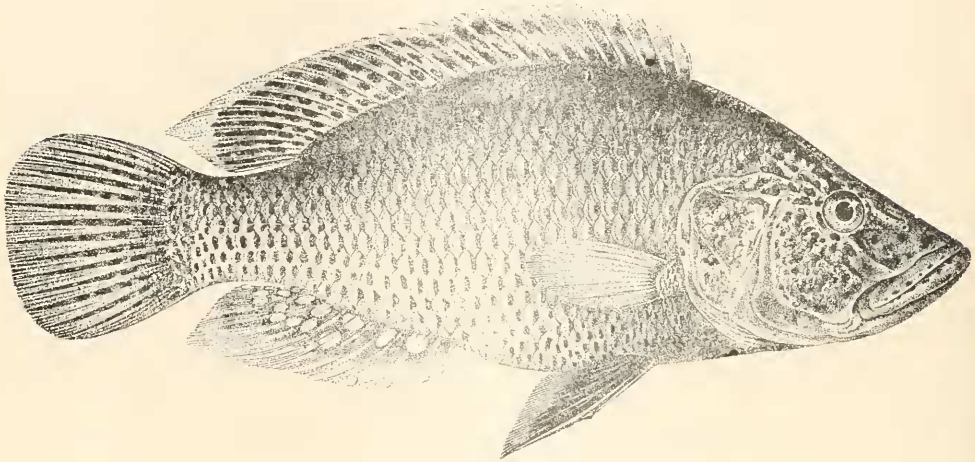


FIG. 142.—*Paratilapia angusticeps*, male. $\frac{1}{2}$.

Teeth small, in 3 or 4 series, 60 to 80 in outer series of upper jaw. Depth of body $2\frac{2}{5}$ to $3\frac{1}{10}$ times in total length excluding caudal, length of head $2\frac{1}{2}$ to 3 times. Head strongly compressed, $2\frac{1}{5}$ (young) to $2\frac{4}{5}$ times as long as broad, with concave upper profile; lower jaw projecting; snout pointed, $1\frac{1}{3}$ to $1\frac{1}{2}$ as long as broad, shorter than postocular part of head; eye $4\frac{1}{2}$ to 7 times in length of head, equal to or a little less than interorbital width or least depth of preorbital; mouth very protractile, extending to below anterior border of eye; premaxillary processes long, extending to between the eyes; 7 to 10 series of scales on the cheek, width of scaly part once to nearly twice diameter of eye. Gill-rakers rather short, occasionally some of the posterior ones bifid, 11 to 12 on lower part of anterior arch.

Dorsal xiv-xvi 14-16; spines increasing in length to the last, which measures $\frac{1}{3}$ to $\frac{2}{5}$ length of head; longest soft rays a little more or a

little less than $\frac{1}{2}$ length of head. Pectoral $\frac{1}{2}$ to a little more than $\frac{3}{5}$ length of head, not extending to vertical of origin of anal. Ventral reaching vent or anal. Anal iii 10-13; 3rd spine as long as or a little shorter than last dorsal spine. Caudal rounded; caudal peduncle as long as or a little longer than deep. Scales feebly denticulate in the young, sometimes perfectly cycloid in the adult, 35-39 $\frac{6-7}{12-18}$; lateral lines $\frac{20-24}{13-18}$.

Colour (of preserved specimens): Females and young brownish above, yellowish beneath, with dark brown spots and dots or marblings,

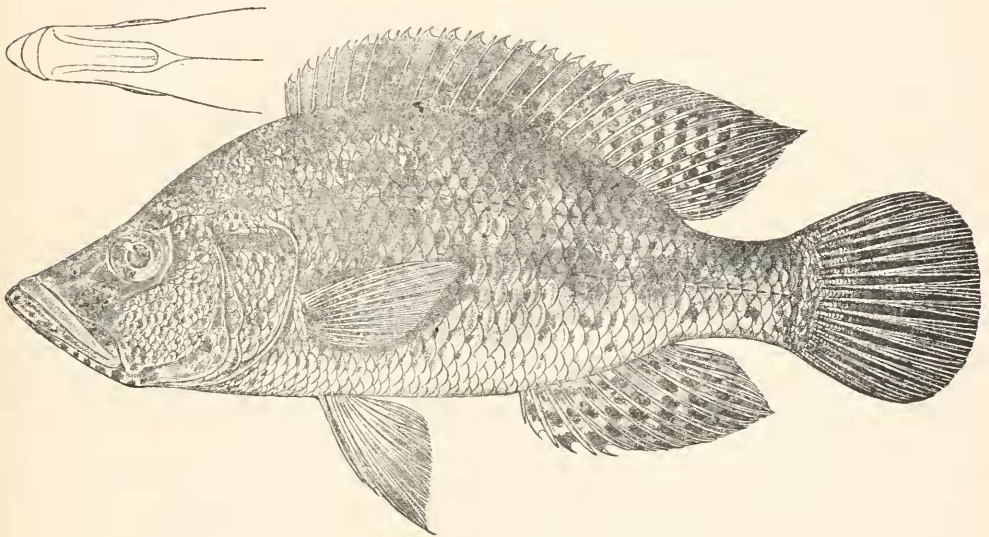


FIG. 144. — *Paratilapia angusticeps*, female. $\frac{1}{2}$.

or with 7 or 8 indistinct dark bars on the body, sometimes with a more or less distinct dark lateral stripe; a blackish opercular spot; dorsal, anal and caudal fins with round or oval brown or blackish spots. Males yellowish olive above, yellow beneath, each scale with a dark brown bar or spot; dorsal and anal sometimes edged with yellow; anal with light ocellar spots.

Two specimens, 293 mm., 173 mm. in length respectively, from Kafue River, Rhodesia.

Two specimens, 74 mm., 69 mm. in length respectively, from Sawmills, Bulawayo, Rhodesia (F. D. McKean).

One specimen, 229 mm. in length, from Victoria Falls, Zambesi River (G. Arnold). Bulawayo Museum.

6. PARATILAPIA THUMBERGII, Cast.

Chromis thumbergi, Casteln., Mém. Poiss. Afr. Austr., p. 13 (1861).

Chromis ngameensis, Casteln., l.c.

? *Chromis livingstonii*, Casteln., l.c.

Hemichromis robustus, Günth., Proc. Zool. Soc., 1864, p. 312.

Hemichromis jallae, Bouleng., Boll. Mus. Torin, xi, 1896, no. 260.

Paratilapia robusta, Bouleng., Proc. Zool. Soc., 1898, p. 141, and Poiss. Bass. Congo, p. 414 (1901); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 266.

Paratilapia thumbergii, Bouleng., Proc. Zool. Soc., 1898, p. 146, Trans. Zool. Soc., xviii, 1911, p. 412, pl. xli, and Freshw. Fish. Africa, iii, p. 328, fig. 220 (1915); Pellegr., t.c., p. 268.

? *Pelmatochromis gruisquamulatus*, Pellegr., Bull. Soc. Zool. France, xxxix, 1914, p. 27; Bouleng., Freshw. Fish. Africa, iv, p. 330 (1916).

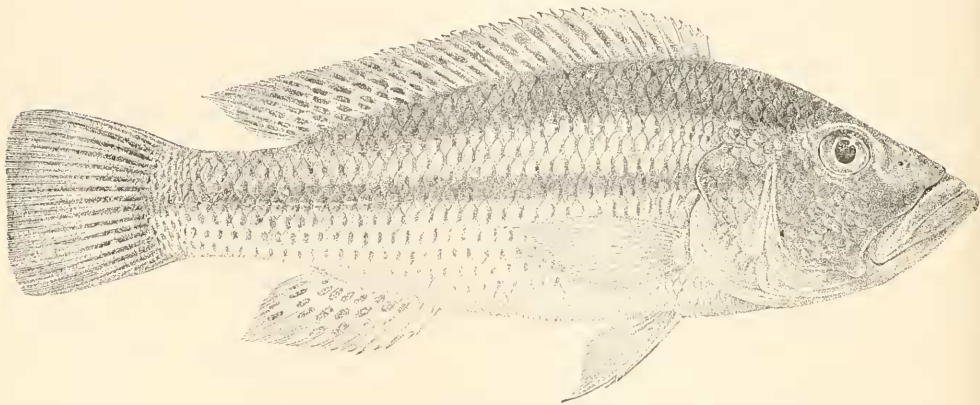


FIG. 145.—*Paratilapia thumbergii*, $\frac{2}{3}$.

Teeth moderate, in two to four series. Depth of body $2\frac{3}{4}$ to $3\frac{1}{5}$ times in total length excluding caudal, length of head $2\frac{2}{3}$ to 3 times. Head 2 to $2\frac{1}{4}$ times as long as broad, upper profile straight, or slightly convex or slightly concave; lower jaw projecting; snout obtusely pointed, as long as or slightly longer than broad, shorter than post-ocular part of head; eye $4\frac{2}{3}$ (young) to 6 in length of head, nearly equal to or less than interorbital width or preorbital depth; mouth extending to below anterior border of eye or a little beyond; 7 to 9 series of scales on the cheek, width of scaly part $1\frac{2}{3}$ to $2\frac{1}{5}$ diameters of eye. Gill-rakers moderately long, some of the posterior usually bifid or trifid, 10 to 12 on lower part of anterior arch.

Dorsal xv-xvi 13-14; spines increasing in length to the last, which is about $\frac{1}{3}$ length of head; longest soft rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Pectoral $\frac{2}{5}$ to $\frac{2}{3}$ length of head, not reaching origin of anal. Ventral usually not reaching vent. Anal iii 10-12; 3rd spine $\frac{1}{4}$ to $\frac{1}{5}$ length of head. Caudal rounded or rounded-subtruncate; caudal peduncle as long as or a little longer than deep. Scales feebly denticulate, sometimes cycloid, 35-38 $\frac{4\frac{1}{2}-5\frac{1}{2}}{12-15}$; lateral lines $\frac{23}{16-17}$.

Colour (of preserved specimens), dark olive or reddish-brown above, yellowish beneath, often with 2 blackish longitudinal bands, the upper above the upper lateral line, the lower from the gill-cover to the base of the caudal fin; dorsal and caudal fins greyish or dark olive, with round blackish or reddish-brown spots; ventrals dark; an indistinct dark opercular spot.

One specimen, 267 mm. in length, from Zambesi River, above Victoria Falls (Mr. F. W. Sykes). The eye is very small in this specimen in comparison with length of snout or interorbital width. Mr. Sykes gives the local designation of the fish as: Batoka name, *Mbofu*; Barotse name, *Simaromo*.

One specimen, 127 mm. in length, from Kafue River (Mr. J. Hotchkiss).

Three specimens, 64 mm., 69 mm., 74 mm. in length respectively, from Sawmills, Bulawayo (Mr. F. D. McKean).

7. PARATILAPIA CODRINGTONI, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (8), ii, 1908, p. 495, and Freshw. Fish. Africa, iii, p. 352, fig. 238 (1915).

Teeth small, in three series, 50 to 60 in outer series of upper jaw. Depth of body twice in total length excluding caudal, length of head 3 times. Head about twice as long as broad, with steep, slightly concave upper profile; snout rounded, slightly longer than broad, shorter than postocular part of head; eye $5\frac{1}{2}$ times in length of head, $\frac{2}{3}$ interorbital width and a little less than preorbital depth; mouth not reaching vertical of anterior margin of eye, maxillary slipping nearly entirely under preorbital; scales on cheek in 5 series, width of scaly part much greater than diameter of eye. Gill-rakers short, 11 on lower part of anterior arch.

Dorsal xiv 14; spines increasing in length to the last, which measures a little more than $\frac{2}{5}$ length of head; longest soft rays $\frac{3}{4}$ length of head. Pectoral $\frac{1}{5}$ length of head, not reaching origin of anal. Ventral reaching to vent. Anal iii 10; 3rd spine shorter than

last dorsal spine. Caudal sub-truncate, slightly emarginate; caudal peduncle deeper than long. Scales cycloid, $35\frac{1}{2}$; lateral lines $\frac{22}{15}$.

Colour (of preserved specimen), brownish, darker on the back, the scales lighter in the centre; a black opercular spot; dorsal almost black, feebly edged with whitish; ventrals dark; anal gray, edged with faint yellow; caudal grayish.

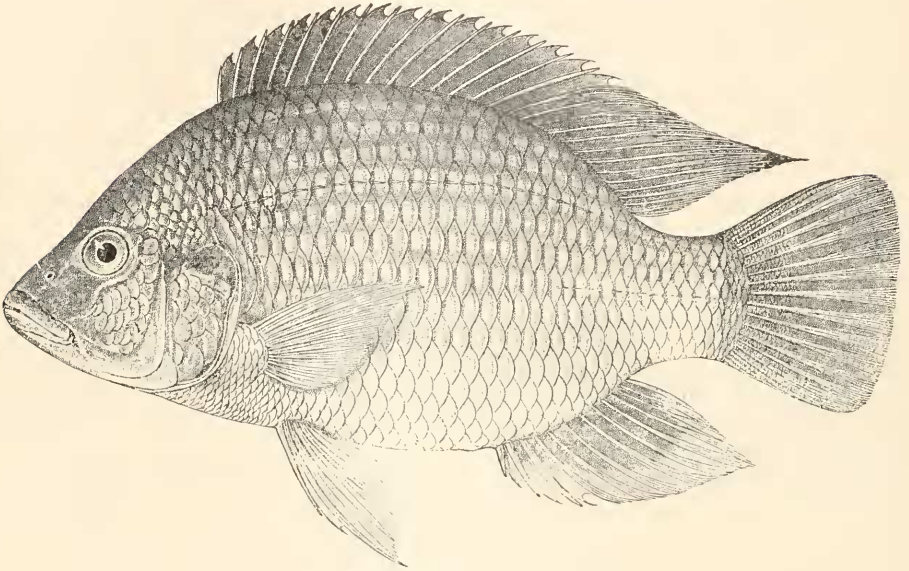


FIG. 146.—*Paratilapia codringtoni*. Type. $\frac{1}{2}$.

One specimen, 202 mm. in length, from Victoria Falls, Zambesi River (G. Arnold). Bulawayo Museum.

One specimen, 233 mm. in length, from Zambesi River. Bulawayo Museum.

8. *PARATILAPIA CARLOTTAE*, Blgr.

Bouleng., Ann. S. Afr. Mus., iii, 1905, p. 301, pl. xiv, and Freshw. Fish. Africa, iii, p. 353, fig. 239 (1915).

Teeth small, in four series on each jaw, those of the outer row largest. Depth of body $2\frac{1}{5}$ times in total length excluding caudal, length of head $3\frac{1}{10}$ times. Head twice as long as broad; snout rounded, with slightly concave upper profile, as long as broad, shorter

than postocular part of head, and $1\frac{2}{5}$ times as long as eye, which is $4\frac{1}{5}$ times in length of head and $1\frac{1}{4}$ times in interorbital width; mouth oblique, $\frac{1}{5}$ width of head, lips well developed, maxillary reaching vertical of anterior margin of eye; 4 series of scales on cheek, width of scaly part greater than diameter of eye. Gill-rakers short, the largest T-shaped, 12 on lower part of anterior arch.

Dorsal xv 12; spines increasing in length to the last, which measures about $\frac{2}{5}$ length of head and a little more than $\frac{2}{5}$ longest soft rays.

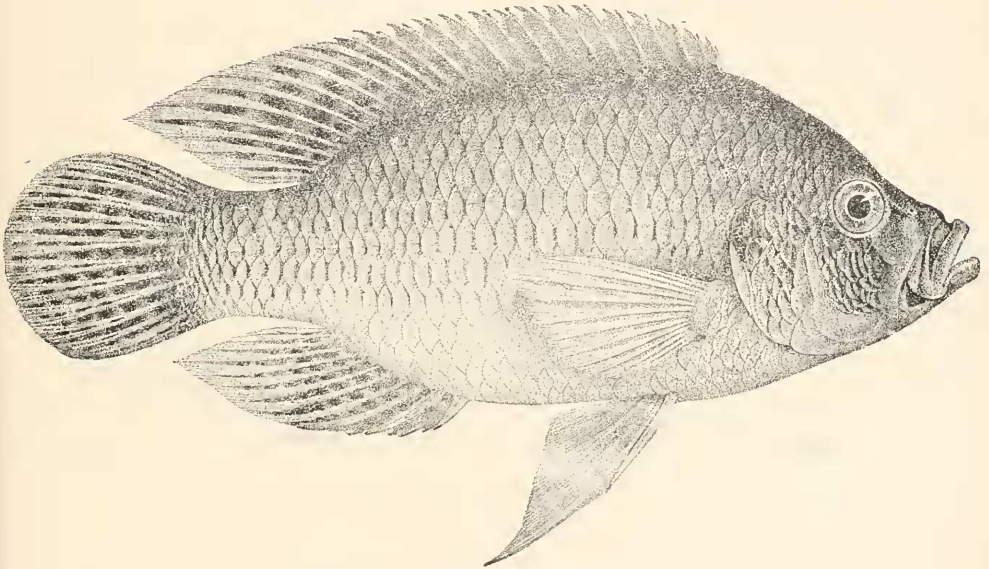


FIG. 147.—*Paratilapia carlottae*. Type. $\frac{1}{2}$.

Pectoral a little shorter than head, not extending to vertical of origin of anal. Ventral reaching to branched rays of anal. Anal iii 10; 3rd spine a little shorter than last dorsal spine. Caudal rounded; caudal peduncle slightly deeper than long. Scales finely denticulate, $33\frac{4}{11}$; lateral lines $\frac{23}{14}$.

Colour (of preserved specimen), light brown, darker above than below; an indistinct dark opercular spot; dorsal, anal and caudal with dark spots in irregular rows.

One specimen, 195 mm. in length, from Zambesi River.

Type in South African Museum.

9. *PARATILAPIA GIBBICEPS*, Blgr.

Bouleng., *Trans. Zool. Soc.*, xviii, 1911, p. 411, pl. xliii, fig. 1, and *Freshw. Fish. Africa*, iii, p. 354, fig. 240 (1915).

Teeth, an outer row of small conical teeth, a little separate from two irregular series of minute teeth. Depth of body $2\frac{1}{4}$ times in total length excluding caudal, length of head $2\frac{4}{5}$ times. Head $1\frac{4}{5}$ times as long as broad, upper profile very convex above the eye; snout rounded,

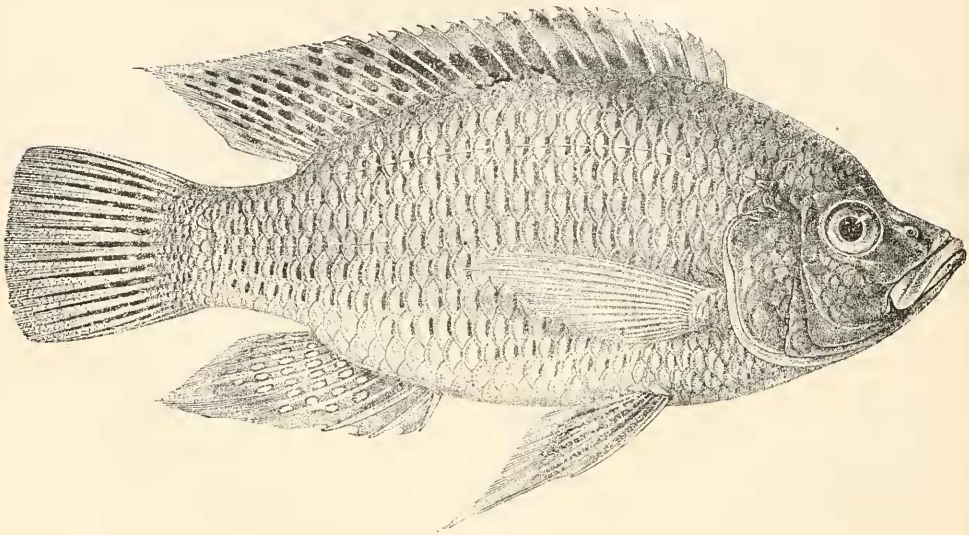


FIG. 148.—*Paratilapia gibbiceps*. Type. $\frac{5}{9}$.

a little broader than long, shorter than postocular part of head; eye $4\frac{3}{10}$ times in length of head, $1\frac{1}{4}$ times in interorbital width, equal to preorbital depth; mouth extending to below anterior border of eye; 4 series of scales on the cheek, width of scaly part a little greater than diameter of eye. Gill-rakers short, posterior T-shaped, 11 on lower part of anterior arch.

Dorsal xiv 13; spines increasing in length to the last, which is $\frac{1}{2}$ length of head; longest soft rays $\frac{2}{5}$ length of head. Pectoral about as long as head, reaching vertical of origin of anal. Ventral reaching beyond origin of anal. Anal iii 10; 3rd spine $\frac{2}{5}$ length of head.

Caudal rounded-subtruncate; caudal peduncle as long as deep. Scales cycloid, $30\frac{4}{10}$; lateral lines $2\frac{2}{3}$.

Colour (of preserved specimen), dark olive brown above, lighter beneath, with a dark bar at the base of the scales; dorsal edged with whitish, the soft portion of fin with regular series of round or oval dark spots; anal with similar spots lighter in shade; ventrals blackish.

One specimen, 119 mm. in length, from Lake Ngami (H. F. Kirkham).

10. *PARATILAPIA MARGINATA*, n. sp.

Teeth, an outer row of short conical teeth, about 40 to 60 on upper jaw, followed by 2 or 3 series of minute teeth on anterior part of jaws. Depth of body 2 to $2\frac{2}{5}$ times in total length excluding caudal, length of head $2\frac{4}{5}$ to nearly 3 times. Head $1\frac{4}{5}$ times to nearly twice as long as broad, upper profile curved, with a depression before the eye; snout with straight or slightly convex upper profile, a little longer than broad, about $\frac{3}{4}$ length of postocular part of head; eye $4\frac{1}{3}$ times in length of head, $\frac{3}{4}$ interorbital width, a little greater than preorbital depth; mouth $\frac{2}{3}$ width of head, reaching to between nostril and eye; 4 to 5 series of scales on cheek, depth of scaly part $1\frac{1}{4}$ to $1\frac{1}{2}$ times diameter of eye. Gill-rakers short, thick, 11 to 12 on lower part of anterior arch.

Dorsal xvi 13; spines increasing in length to the last, which is nearly $\frac{1}{2}$ length of head; longest soft rays $\frac{3}{5}$ to $\frac{4}{5}$ length of head. Pectoral a little more than $\frac{7}{10}$ length of head, reaching to vent. Ventral as long as pectoral, reaching to or slightly beyond vent. Anal iii 9-10, 3rd spine a little shorter than longest dorsal spine. Caudal truncate, feebly emarginate and with slightly rounded corners; caudal peduncle $1\frac{3}{10}$ as deep as long. Scales cycloid, 33-36 $\frac{6}{12}$; lateral lines $\frac{22-24}{14-16}$.

Colour (of preserved specimen) olive green, dark above, light beneath, scales with a light marginal band; a dark opercular spot; spinous dorsal edged with yellowish, soft dorsal with dark and a few light spots and with the outer half of the fin yellowish; anal with a few indistinct light spots and with a broad yellowish margin; outer half of caudal yellowish; ventrals dark, tipped with yellowish; pectoral pale yellowish.

One specimen, 95 mm. in length, from Lialui, Upper Zambesi (Rev. Ellenberger).

One specimen, 232 mm. in length, from Bulawayo Museum.

* 11. PARATILAPIA FREDERICI, Cast.

Chromys frederici, Casteln., Mém. Poiss. Afr. Austr., p. 15 (1861).

Chromidotilapia (?) *frederici*, Bouleng., Proc. Zool. Soc., xviii, 1911, p. 409, pl. xxxix, fig. 1.

Paratilapia frederici, Bouleng., Trans. Zool. Soc., xviii, 1911, p. 409, pl. xxxix, fig. 1, and Freshw. Fish. Africa, iii, p. 355, fig. 241 (1915).

Depth of body $2\frac{1}{2}$ times in total length, length of head 3 times. Head twice, or a little over twice, as long as broad, upper profile slightly concave in front of the eyes; snout rounded, as long as broad, as long as or slightly longer than postocular part of head; eye 5 to $5\frac{1}{3}$ times in length of head, $1\frac{1}{5}$ to $1\frac{1}{4}$ times in interorbital width, less

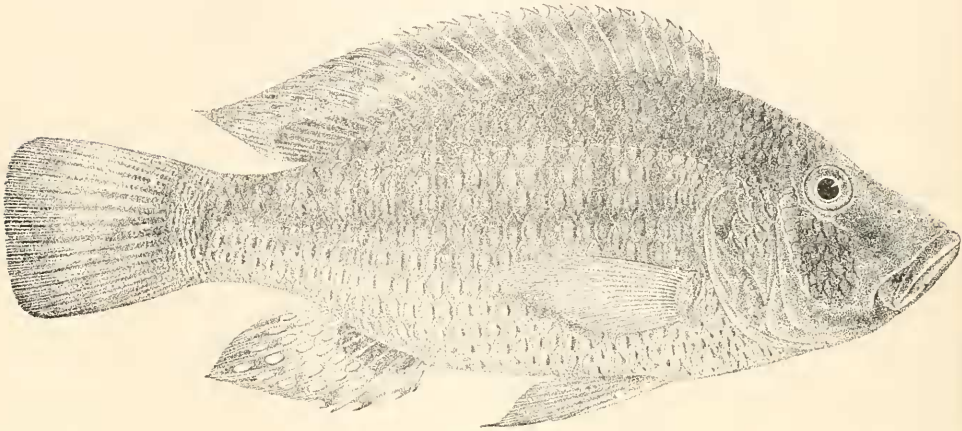


FIG. 149.—*Paratilapia frederici*. $\frac{2}{3}$.

than preorbital depth; mouth not extending to below anterior border of eye; teeth in outer series rather small, 50 to 60 in upper jaw, followed by one or two irregular series of minute teeth confined to the anterior part of the jaws; 3 to 5 series of scales on the cheek, width of scaly part greater than diameter of eye. Lower pharyngeal teeth with spherical crowns. Gill-rakers short, knob-like or anvil-shaped, 11 or 12 on lower part of anterior arch.

Dorsal xv 13-14; spines increasing in length to the last, which is about $\frac{2}{5}$ length of head; longest soft rays $\frac{3}{5}$ to $\frac{3}{4}$ length of head. Anal iii 8-9; 3rd spine $\frac{1}{3}$ length of head. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head, not reaching vertical of origin of anal. Ventral reaching vent. Caudal rounded; caudal peduncle as long as deep. Scales cycloid, 32-34 $\frac{31}{11}$; lateral lines $\frac{21-23}{14-15}$.

Olive above, paler beneath, with or without a vertical brown bar at the base of each scale; sometimes with a blackish lateral band, which may be traversed by 8 blackish vertical bars; dorsal green or olive, sometimes edged with red, with round yellowish-brown spots on the soft part; anal green or pink, with numerous round pinkish-white spots; pectorals lake-red; ventrals olive-green.

Total length 210 millim.

Lake Ngami Basin."

* 12. PARATILAPIA SMITHII, Cast.

? *Chromys smithii*, Casteln., Mém. Poiss. Afr. Austr., p. 16 (1861).

Paratilapia smithii, Bouleng., Trans. Zool. Soc., xviii, 1911, p. 410, pl. xxxix, fig. 2, and Freshw. Fish. Africa, iii, p. 357, fig. 242 (1915).

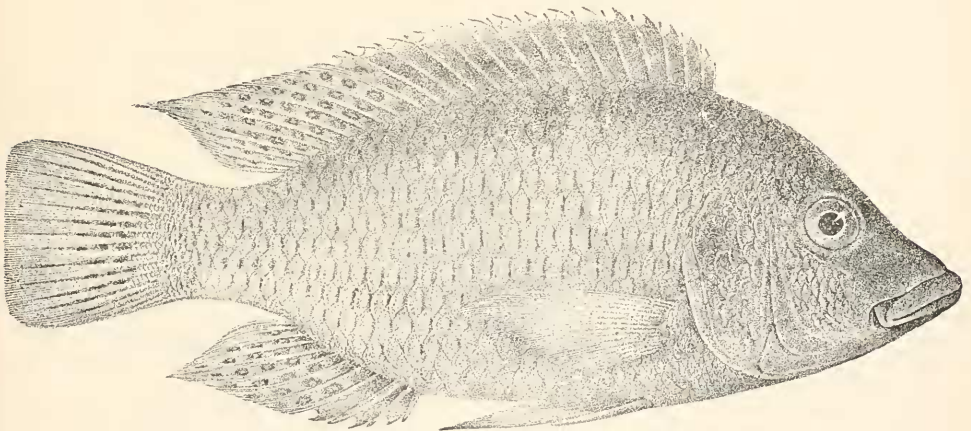


FIG. 150.—*Paratilapia smithii*. ♀.

"Depth of body $2\frac{1}{3}$ to $2\frac{1}{2}$ times in total length, length of head 3 times. Head twice as broad, upper profile slightly concave in front of eyes; snout rounded, as long as broad, as long as postocular part of head; eye 4 to $4\frac{1}{2}$ times in length of head, $1\frac{1}{3}$ to $1\frac{1}{4}$ times in interorbital width, equal to preorbital depth; mouth not extending to below anterior border of eye; teeth in outer series rather small, 52 to 64 in upper jaw, followed by one or two series of minute teeth; 5 series of scales on the cheek, width of scaly part greater than diameter of eye. Lower pharyngeal teeth with spherical crowns. Gill-rakers short, knob-like, 9 to 12 on lower part of anterior arch.

Dorsal xiv-xv 12-13; spines increasing in length to the last, which is about $\frac{2}{5}$ length of head; longest soft rays $\frac{1}{2}$ to $\frac{2}{3}$ length of head. Anal iii 8-9; 3rd spine about $\frac{1}{3}$ length of head. Pectoral $\frac{3}{4}$ to $\frac{4}{5}$ length of head, not extending to vertical of origin of anal. Ventral reaching vent or anal, or not so far. Caudal rounded-subtruncate. Caudal peduncle as long as deep or a little deeper than long. Scales cycloid or indistinctly denticulate, 33-34 $\frac{3\frac{1}{2}}{10-11}$; lateral lines $\frac{21-23}{13-15}$.

Brown to blackish above, yellowish or dark grey beneath; vertical fins olive-grey or dark brown, with round dark or ocellar spots forming single series between the rays; pectorals greyish olive or blackish.

Total length 220 millim.

Lake Ngami Basin. Type lost."

13. PARATILAPIA MELLANDI, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (7), xvi, 1905, p. 646, and Freshw. Fish. Africa, iii, p. 358, fig. 243 (1915).

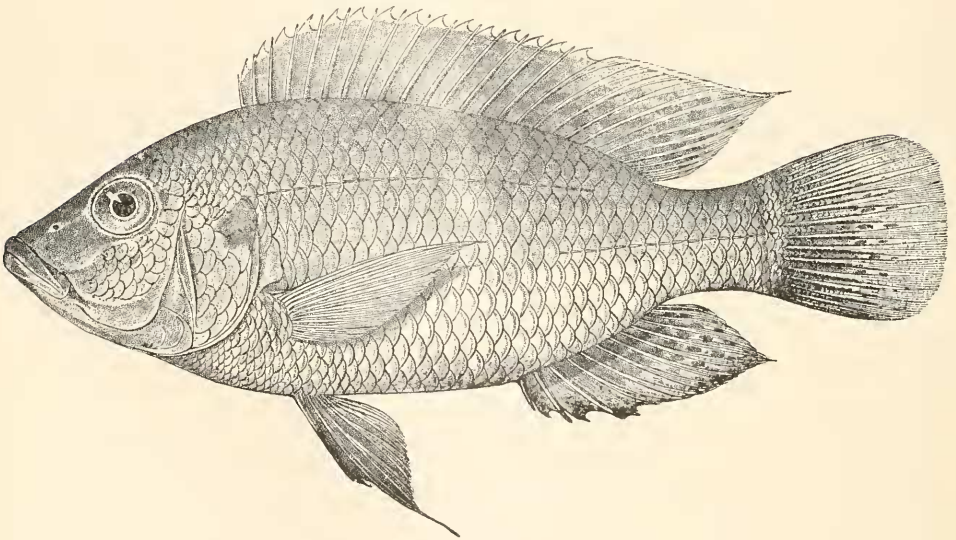


FIG. 151.—*Paratilapia mellandi*. Type. $\frac{5}{6}$.

Teeth in three or four series, outer largest, 36-50 in upper jaw. Depth of body $2\frac{1}{2}$ to 3 times in total length excluding caudal, length of head $2\frac{4}{5}$ to 3 times. Head a little more than twice as long as broad; snout obtusely pointed, with straight upper profile, as long as broad, as long as or slightly less than postocular part of head, $1\frac{1}{3}$ to $1\frac{3}{5}$ times

as long as eye, which is $3\frac{2}{5}$ to 4 in length of head, and equals or slightly exceeds interorbital width, equals preorbital depth; mouth moderate, $\frac{1}{2}$ to $\frac{2}{3}$ width of head, extending to between nostril and eye; 4 series of scales on the cheek, width of scaly part equal to or slightly greater than diameter of eye. Gill-rakers short, 10 to 12 on lower part of anterior arch.

Dorsal xv-xvi 12-13; spines increasing in length to the last, which measures $\frac{2}{5}$ to $\frac{1}{2}$ length of head; longest soft rays $\frac{2}{5}$ to $\frac{7}{10}$ length of head. Pectoral a little shorter than head, reaching to vent or a little beyond. Ventral reaching to vent or to origin of anal. Anal iii 8-9; 3rd spine $\frac{1}{3}$ to $\frac{1}{2}$ length of head. Caudal rounded-subtruncate; caudal peduncle as long as deep. Scales cycloid, 32-34 $\frac{4-4\frac{1}{2}}{11}$; lateral lines $\frac{21-23}{13-15}$.

Colour (of preserved specimens) light brown, darker above than below, with rather indistinct dark cross-bars; dorsal, anal and caudal with numerous round or ocellar dark spots; pectorals greyish; ventrals blackish; a dark opercular spot.

Four specimens, ranging from 86-147 mm. in length, from Kafue River, Rhodesia (J. Drury.)

One specimen, 118 mm. in length, from Kafue River, collected by Rogers and Chubb. Bulawayo Museum.

PELMATOCHROMIS.

Pelmatochromis, Steindr., Notes Leyd. Mus., xvi, 1894, p. 40; Bouleng., Proc. Zool. Soc., 1898, p. 147, Poiss. Bass. Congo, p. 433 (1901); Fish. Nile, p. 484 (1907), and Freshw. Fish. Africa, iii, p. 377 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 275.

Chromidotilapia, Bouleng., Proc. Zool. Soc., 1898, p. 151.

“Barely distinguishable from *Paratilapia* by the greater development of a papillose pad on each side of the pharynx, close to the upper part of the branchial arches, and appearing as a strong prominence in front of the latter when the gill-cover is lifted up.”

I. *PELMATOCHROMIS DARLINGI, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (8), vii, 1911, p. 377; and Freshw. Fish. Africa, iii, p. 410, fig. 280 (1915).

“Depth of body equal to length of head, $2\frac{1}{5}$ times in total length. Head $2\frac{1}{3}$ times as long as broad; snout as long as broad, with slightly convex upper profile, a little longer than eye, which is $3\frac{2}{3}$ times in length of head and slightly exceeds interorbital width or preorbital

depth; mouth moderate, extending to below anterior border of eye; 3 series of teeth, outer rather large, 50 in upper jaw; 4 series of scales on the cheek, width of scaly part slightly less than diameter of eye. Gill-rakers very short, 9 on lower part of anterior arch.

Dorsal xv 11; spines increasing in length to the last, which measures $\frac{1}{2}$ length of head; longest soft ray $\frac{2}{3}$ length of head. Anal iii 8; 3rd spine stronger but a little shorter than last dorsal. Pectoral a little shorter than head, reaching vertical of origin of anal. Ventral extending a little beyond origin of anal. Caudal rounded (obliquely

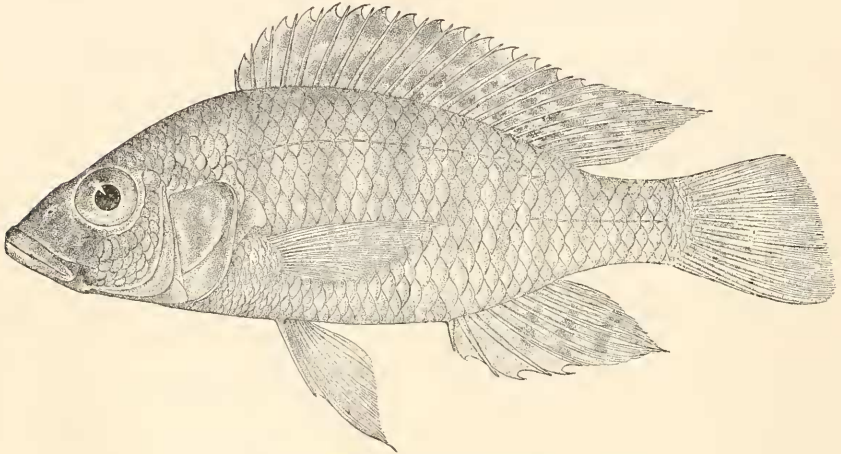


FIG. 152.—*Pelmatochromis darlingi*. Type.

subtruncate). Caudal peduncle a little longer than deep. Scales feebly denticulate, $32\frac{3}{10}$; lateral lines $\frac{22}{10}$.

Brownish above, whitish beneath, with seven very indistinct darker cross-bars; a dark bar below anterior third of eye; dorsal and anal fins with round brown spots.

Total length 110 millim.

Makabusi River, Zambesi System."

2 PELMATOCHROMIS SPEKII, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (7), xvii, 1906, p. 440, Fish.

Nile, p. 486, pl. lxxxviii, fig. 2 (1907), Ann. Mus. Genova (3), v, 1911, p. 69, and Freshw. Fish. Africa, iii, p. 416, fig. 285, (1915).

Teeth conical, in three rows, outer larger and slightly curved, about

60 in upper jaw. Depth of body $3\frac{1}{5}$ to $3\frac{1}{10}$ times in total length excluding caudal, length of head $2\frac{7}{10}$ to $2\frac{1}{5}$ times. Head large, $2\frac{3}{10}$ to $2\frac{1}{2}$ times as long as broad, with straight or slightly concave upper profile; snout a little longer than broad, $1\frac{1}{5}$ to $1\frac{1}{4}$ times as long as eye (in young), which is $3\frac{2}{10}$ to $4\frac{2}{10}$ times in length of head, $1\frac{1}{3}$ to $1\frac{2}{5}$ times in interorbital width, and exceeds least depth of preorbital; mouth large, oblique, extending to below anterior border of eye or not quite so far, lower jaw slightly projecting; 4 to 5 series of scales on the cheek, width of scaly part equal to diameter of eye (in young). Gill-rakers short, 10 on lower part of anterior arch.

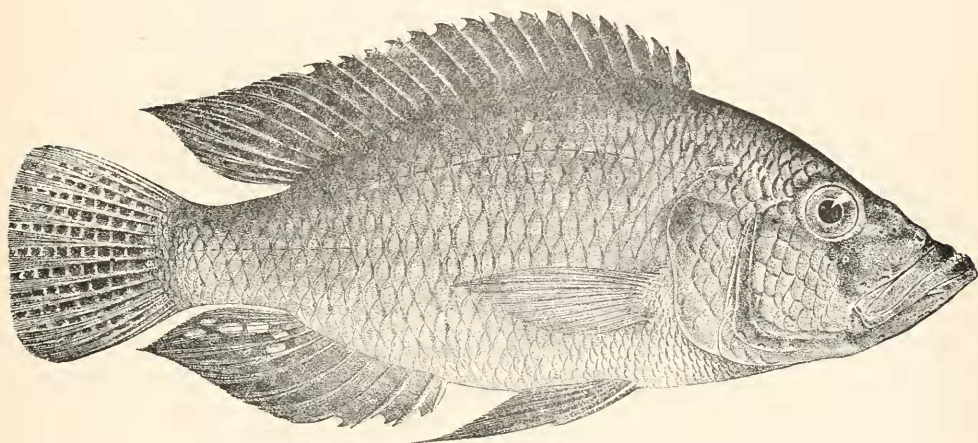


FIG. 153.—*Pelmatochromis speki*. Type. $\frac{1}{2}$.

Dorsal xv-xvi 8-11; spines increasing in length to the last, which is $\frac{1}{3}$ to $\frac{2}{5}$ length of head; longest soft rays $\frac{2}{5}$ to $\frac{1}{2}$ length of head. Pectoral $\frac{2}{3}$ to $\frac{7}{10}$ length of head, not reaching anal. Ventral reaching to vent or a little beyond. Anal iii 8; 3rd spine $\frac{1}{3}$ length of head, stronger than dorsal spines. Caudal rounded-subtruncate; caudal peduncle $1\frac{1}{2}$ times as long as deep. Scales cycloid or feebly denticulate, 29-33 $\frac{4\frac{1}{2}-5\frac{1}{2}}{11-12}$; lateral lines $\frac{22-21}{14-17}$.

Colour (of preserved specimens) light reddish brown, darker above than below, with faint dark cross-bars on the back; 2 more or less distinct dark lateral stripes, and an indistinct dark vertical bar below the eye; a dark opercular spot; soft dorsal and caudal with faint dark spots.

Six specimens, ranging from 60 to 83 mm. in length, from Magalies River, Transvaal. Pretoria Museum.

These specimens are small in comparison with the type from which the species is described, but they appear to belong to this species.

P. spekii is also reported from Lake Victoria and the Victoria Nile, and Lake Albert Edward.

3. PELMATOCHROMIS ROBUSTUS, n. sp.

Teeth, an outer row of short, conical teeth on each jaw, about 50 on upper jaw, followed by a similar row of smaller ones, with a few detached teeth behind them. Depth of body $2\frac{3}{5}$ times in total length

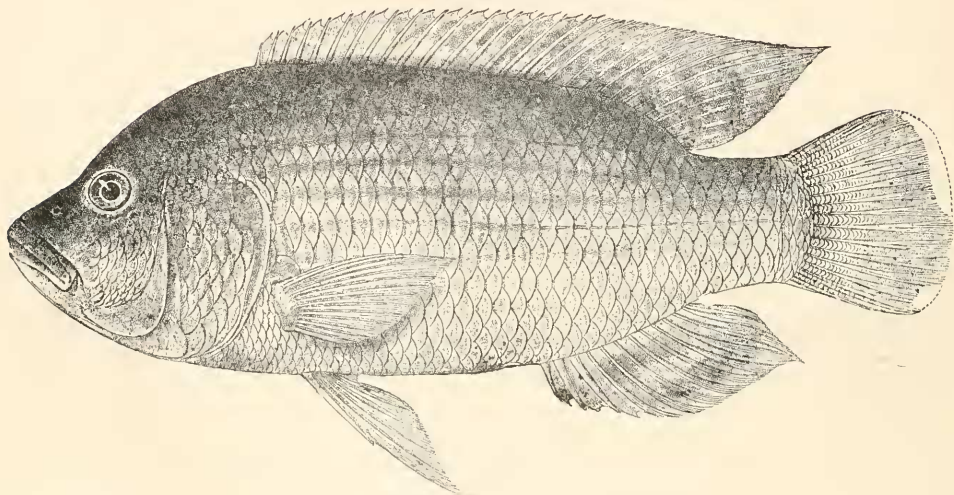


FIG. 154.—*Pelmatochromis robustus*. Type. $\frac{1}{2}$.

excluding caudal, length of head 3 times. Head $1\frac{7}{10}$ times as long as broad, with a rounded profile, concave before the eyes; snout rounded, with slightly concave upper profile, as long as broad, $\frac{3}{4}$ length of postocular part of head; eye 6 times in length of head, nearly twice in interorbital width, a little less than least depth of preorbital; mouth oblique, $\frac{2}{3}$ width of head, extending nearly to vertical of anterior border of eye; 6 series of scales on cheek, depth of scaly part $1\frac{3}{4}$ times diameter of eye. Gill-rakers short, thick, anvil-shaped at the angle, 11 on lower part of anterior arch.

Dorsal xvi 13; spines increasing in length to the last, which is $\frac{1}{3}$ length of head; longest soft rays nearly $\frac{3}{4}$ length of head. Pectoral $\frac{7}{10}$ length of head, reaching to vent. Ventral reaching to vent. Anal iii 10; 3rd spine $\frac{4}{5}$ length of longest dorsal spine, Caudal (broken in

specimen, truncate apparently); caudal peduncle $1\frac{1}{5}$ times as deep as long. Scales cycloid or feebly denticulate, $34\frac{4}{11}$; lateral lines $\frac{2\frac{4}{5}}$.

Colour (of preserved specimen) dark brown above, lighter beneath; scales lighter in the centre, forming indistinct longitudinal streaks following the series of scales; faint, very indistinct dark patches or cross-bars on body; a dark opercular spot; dorsal with indistinct dark and light streaks; anal light in centre with some indistinct orange markings near outer border.

One specimen, 277 mm. in length, from Sawmills, Bulawayo, Rhodesia (Mr. F. D. McKean).

4. PELMATOCHROMIS NGAMENSIS, n. sp.

Teeth, an outer row of small conical teeth with swollen bases, about 40 on upper jaw, with an inner series of small, irregularly placed teeth

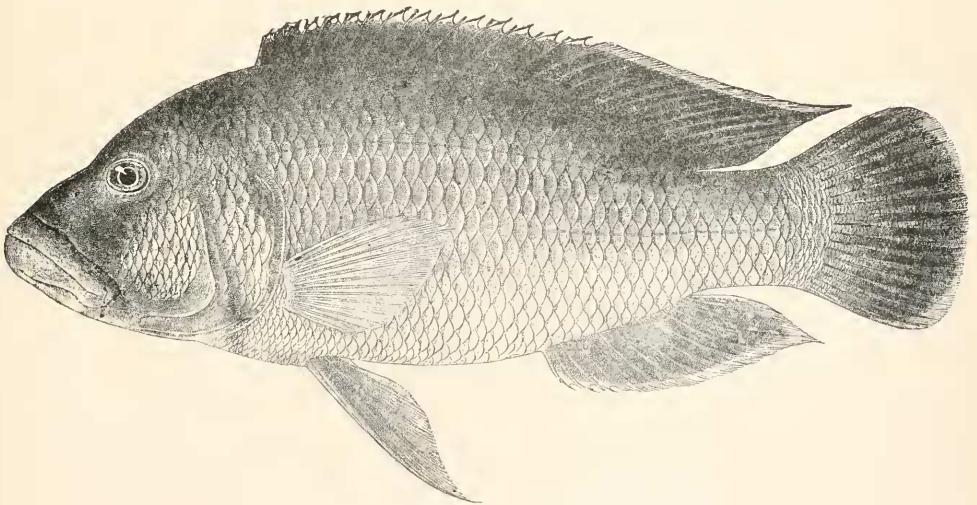


FIG. 155.—*Pelmatochromis ngamensis*. Type. $\frac{1}{3}$.

some distance behind them. Depth of body $2\frac{2}{3}$ times in length of head excluding caudal, length of head 3 times. Head $1\frac{7}{10}$ times as long as broad, upper profile rounded, concave before the eyes; snout rounded, with straight upper profile, as long as broad, shorter than postocular part of head; eye $6\frac{7}{10}$ times in length of head, $1\frac{4}{5}$ times in interorbital width, nearly $\frac{2}{3}$ least depth of preorbital; width of mouth a little more than $\frac{1}{5}$ width of head, maxillary reaching to below middle or anterior third of eye; 7 or 8 series of scales on the cheek,

width of scaly part $2\frac{2}{3}$ times diameter of eye. Gill-rakers short, T-shaped near the angle, 11 to 12 on lower part of anterior arch.

Dorsal xv 15; spines weak, increasing in length to the last, which measures $\frac{1}{4}$ length of head; longest soft rays $\frac{2}{3}$ length of head. Pectoral nearly $\frac{2}{3}$ length of head, not reaching vent. Ventral reaches to anal. Anal iii 11; 3rd spine nearly as long as longest dorsal spine. Caudal truncate; caudal peduncle as long as deep. Scales feebly denticulate, $35\frac{5}{14}$; lateral lines $\frac{2.5}{16}$.

Colour (of preserved specimen) dark olive-brown above, lighter beneath; scales on the body—especially those below the median line—with a light rim on outer edge and all scales with a dark bar at base; dorsal fin dark-coloured, almost black, with a white outer edge especially on the soft rays; anal dark, with dark and light spots and with a greenish-yellow margin; caudal dark, with light tips to the somewhat rounded lobes; pectorals pale brown with a light margin; ventral dark with a light tip.

One specimen, 350 mm. in length, from Lake Ngami District (Mr. H. F. Kirkham).

HEMICHROMIS.

Hemichromis, Peters, Mon. Berl. Ac., 1857, p. 403; Günth., Cat. Fish., iv, p. 274, part. (1862); Bouleng., Proc. Zool. Soc., 1898, p. 134, Poiss. Bass. Congo, p. 409 (1901), Fish. Nile, p. 467 (1907), and Freshw. Fish. Africa, iii, p. 427 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 252.

Chromichthys, Guichen., in A. Dum. Arch. Mus., x, 1859, p. 257.

“Body short or moderately elongate; scales cycloid or very feebly denticulate; two incomplete lateral lines. Teeth conical, in one series, or with one, very rarely two, series of a few very small teeth behind the outer; the two median teeth of the outer series usually larger than the others. Maxillary bone narrow and curved behind, concealed when the mouth is closed. Dorsal with 13 to 15 spines, anal with 3. Occipital and parietal crests strong, extending to between the orbits; premaxillary processes extending to between the orbits. Vertebrae 26–28.

Africa.”

HEMICHROMIS FASCIATUS, Peters.

Hemichromis fasciatus, Peters, Mon. Berl. Ac., 1857, p. 403; Günth., Cat. Fish., iv, p. 274 (1862); Bleek., Nat. Verh. Vet. Haarlem, xviii,

No. 2, 1863, p. 38, pl. v, fig. 1; Steindr., Sitzb. Ak. Wien, lx, i, 1870, p. 970, and Notes Leyd. Mus., xvi, 1894, p. 47; Sauv., N. Arch. Mus. (2), iii, 1880, p. 35; Bouleng., Proc. Zool. Soc., 1898, p. 135, Poiss. Bass. Congo, p. 409 (1901), and Freshw. Fish. Africa, iii, p. 428, fig. 293 (1915); Pellegr., Mém. Soc. Zool. France, xvi, 1904, p. 253.

Chromichthys elongatus, Guichen. in A. Dum., Arch. Mus., x, 1859, p. 257, pl. xxii, fig. 3.

Hemichromis auritus, Gill, Proc. Ac. Philad., 1862, p. 135; Günth., t.c., p. 275.

Hemichromis leiguardii, Capello, Jorn. Sc. Lisb., iv, 1872, p. 85.

Hemichromis desquezi, Rochebr., Bull. Soc. Philom. (7), iv, 1880, p. 168, and Act. Soc. Linn. Bord., vi, 1882, p. 113, pl. v, fig. 6.

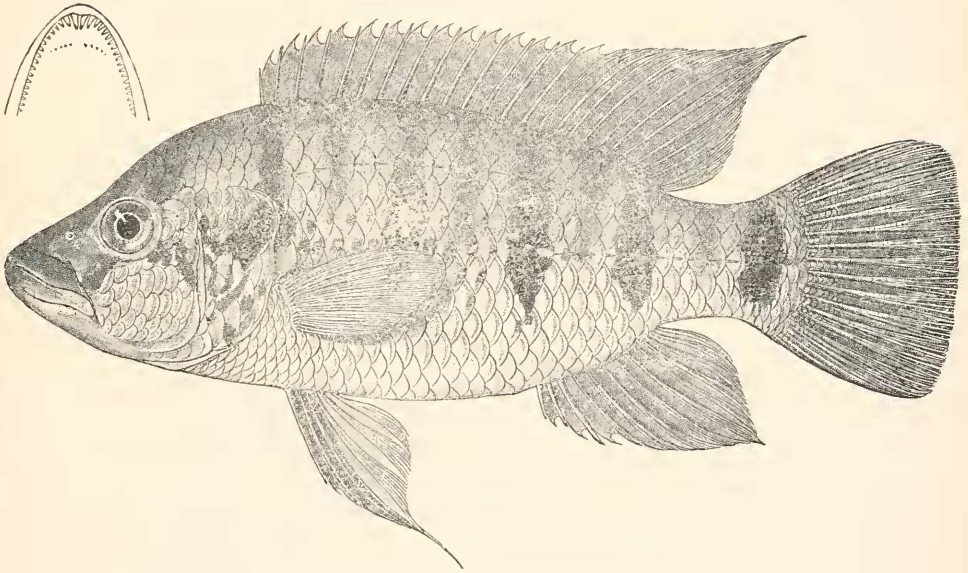


FIG. 156.—*Hemichromis fasciatus*.

Teeth, middle outer ones enlarged and canine-like, with an inner series of small teeth on upper jaw widely separated from the outer ones. Depth of body about the same as length of head and $2\frac{2}{5}$ times in total length excluding caudal. Head twice as long as broad; snout with straight upper profile, $1\frac{3}{5}$ times diameter of eye, which is $4\frac{2}{5}$ times in length of head and $1\frac{1}{4}$ times in interorbital width; lower jaw projecting; mouth not extending to below anterior border of eye; 5 series of scales on the cheek, width of scaly part $1\frac{1}{2}$ times diameter

of eye. Gill-rakers short, the largest anvil-shaped, 9 on lower part of anterior arch.

Dorsal xiv 12; spines increasing in length to the last, which measures $\frac{1}{3}$ length of head and $\frac{1}{2}$ that of longest soft rays. Pectoral nearly $\frac{2}{3}$ length of head, not extending to vertical of origin of anal. Ventral produced into a filament, reaching to vent. Anal iii 10; 3rd spine slightly shorter than last dorsal spine. Caudal subtruncate; caudal peduncle a little deeper than long. Scales cycloid or feebly denticulate, 29 $\frac{3\frac{1}{2}}{10}$; lateral lines $\frac{17}{4}$.

Colour (of preserved specimen) yellowish-brown above, pale yellowish beneath; 5 more or less distinct black blotches or bars on each side, the last situated at the base of the caudal, with faint bars uniting them with base of dorsal and one or two narrower faint bars between them; a large blackish opercular spot; a faint diagonal streak from angle of mouth through eye to nape; anal and ventral fins blackish; pectoral pale yellowish; caudal blackish on lower half, light above.

One specimen, 103 mm. in length, from Victoria Falls, Zambesi River (J. W. Soper). Bulawayo Museum.

This species is also reported from Senegambia to Angola and Lake Ngami.

DIVISION LABYRINTHICI.

FAMILY ANABANTIDÆ.

As a group the Labyrinthici are "remarkable for the time they can live out of water and for their habit of migrating overland from one pond or stream to another" (Regan, P. Z. S., 1909, pt. iv, p. 769). This is due to their possession of a superbranchial respiratory organ composed of thin bony laminae, which are more or less folded and covered with a mucous membrane and situated in a cavity above the gills. One of the family, *Anabas scandens*, is the so-called Climbing Perch—a common Indian species, not found in South Africa.

ANABAS.

Anabas, Cuv., Règne Anim., ii, p. 339 (1817); Günth., Cat. Fish., iii, p. 374 (1861); Bouleng., Poiss. Bass. Congo, p. 371 (1901), Fish. Nile, p. 441 (1907), and Freshw. Fish. Africa, iv, p. 48 (1916).

Spirobranchus, Cuv. and Val., Hist. Nat. Poiss. vii, p. 392 (1831); Günth., t.e., p. 373.

Oteuopoma, Peters, Mon. Berl. Ac., 1844, p. 34; Günth., t.c., p. 373; Peters, Reise Mossamb., iv, p. 14 (1868).

Sandelia, Casteln., Mém. Poiss. Afr. Austr., p. 36 (1861).

“Body short or moderately elongate, more or less compressed, covered with large, hard, ctenoid scales; lateral line interrupted. Head convex, covered with scales; mouth moderately large, with small conical teeth; teeth on the vomer and on the parasphenoid; palatine teeth present or absent. Anterior nostril in a short tube. Spinous part of the dorsal and anal fins longer than the soft; 12 to 20 dorsal and 6 to 11 anal spines. Vertebrae 25 to 31.

South-eastern Asia and Tropical and South Africa.”

Synopsis of the Species.

Caudal peduncle very distinct, measuring at least the diameter of the eye; depth of body more than $2\frac{1}{2}$ times in total length.

Ventral fin not reaching anal; maxillary extending to below anterior third of eye, or beyond; teeth on palatine bones.

(a) 12 to 17 dorsal spines; suboperculum not denticulate; scales partly cycloid partly ctenoid.

D. xii-xiv 7-10; A. vi-viii 8-11; Sc.

26-30 $\frac{3-4}{9-10}$ 1. *A. capensis*, Cuv. & Val.

D. xiii-xv 8-9; A. viii-ix 8-9; Sc.

27-29 $\frac{3-4}{10-11}$ 2. *A. vicinus*, Blgr.

D. xv-xvii 9-10; A. vii-viii 9-10; Sc.

31-35 $\frac{6-7}{13-15}$ 3. *A. bainsii*, Casteln.

(b) 17-20 dorsal spines; suboperculum denticulate; scales all ctenoid.

D. xvi-xix 8-9; A. vii-x 8-10; Sc.

30-35 $\frac{2-3}{8-9}$ 4. *A. multispinis*, Peters.

D. xviii 10; A. ix 9; Sc. 31 $\frac{3}{5}$ 5. *A. rhodesianus*, n. sp.

I. ANABAS CAPENSIS, Cuv. and Val.

Spirobranchus capensis, Cuv. and Val., Hist. Nat. Poiss., vii, p. 392, pl. cc (1831); Val. in Cuv., Règne Anim. Ill., Poiss., pl. lxxv, fig. 1 (1836); Casteln., Mém. Poiss. Afr. Austr., p. 36 (1861); Günth., Cat. Fish., iii, p. 373 (1861).

Anabas capensis, Bouleng., Ann. and Mag. Nat. Hist. (7), xvi, 1905, p. 53, and Freshw. Fish. Africa, iv, p. 50, fig. 27 (1916).

Teeth in a villiform band on each jaw, those of the outer row larger; in a narrow band on vomer and palatines. Depth of body $2\frac{3}{5}$ to $3\frac{1}{10}$ times in total length excluding caudal, length of head

$2\frac{1}{2}$ to 3 times. Snout $3\frac{1}{2}$ to 5 times in length of head, eye 3 (young) to $7\frac{1}{3}$ times, interorbital width $3\frac{1}{2}$ to $4\frac{1}{2}$ times (in the smaller specimens, up to about 60 mm. in length, the snout, eye and interorbital width appear to be equal to each other); maxillary extends to below anterior margin or middle of eye; preoperculum entire; opercle terminates in a semicircular notch, which has a moderately strong flat spine at each corner and is filled with a membrane usually of a blackish colour; chin prominent. Scales on head and cheeks, snout naked; 6 series of scales between orbit and angle of preoperculum, 4 transverse series on operculum, 1 series along sub- and interoperculum.

Dorsal xii-xiv 7-10; last spine longest, $\frac{1}{5}$ to $\frac{1}{3}$ length of head; soft portion of fin higher than spinous, about $\frac{1}{2}$ length of head. Pectoral

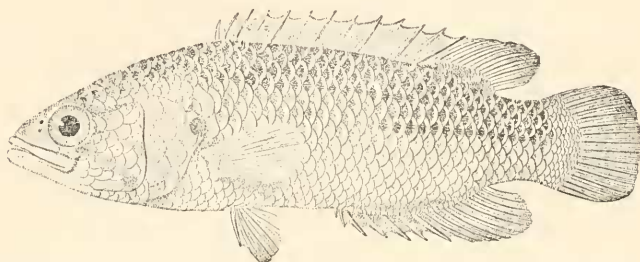


FIG. 157.—*Aulabts capensis*. Type, after Cuvier and Valenciennes.

$\frac{1}{2}$ to $\frac{2}{3}$ length of head. Ventral $\frac{2}{5}$ to $\frac{1}{2}$ length of head. Anal vi-viii 8-10; longest spine equal to or a little less than longest dorsal spine. Caudal rounded-subtruncate; caudal peduncle much deeper than long. Scales ctenoid, 26-28 $\frac{3-3\frac{1}{2}}{9-10}$; lateral lines $\frac{15-18}{9-14}$.

Colour (of preserved specimens), reddish or olive-brown, darker above than beneath; scales with a dark centre; 3 oblique dark streaks radiating from orbit to preopercle.

Five specimens, ranging from 58-177 mm., from Princess Vlei, Cape Peninsula.

Fifteen specimens, ranging from 38-152 mm., from the Cape Flats, Cape Peninsula.

Five specimens, ranging from 81-96 mm., from the vlei at Lakeside, Cape Peninsula.

One specimen, 101 mm. in length, from Woodville, George, Cape Province.

Four specimens, ranging from 63-91 mm. in length, from George River, near George, Cape Province.

One specimen, 97 mm. in length, from Le Roux River, Oudtshoorn, Cape Province.

Five specimens, ranging from 25–37 mm. in length, from Grobelaars River, near Oudtshoorn, Cape Province.

Two specimens, 60 mm., 70 mm. in length respectively, from Baakens River, Port Elizabeth, Cape Province.

* 2. *ANABAS VICINUS*, Blgr.

Bouleng., Freshw. Fish. Africa, iv, p. 51, fig. 28 (1916).

“Depth of body $2\frac{3}{8}$ to 3 times in total length, length of head $2\frac{3}{4}$ to 3 times. Snout rounded, as long as or a little shorter than eye, which is 4 to 5 times in length of head and 1 to $1\frac{1}{2}$ times in inter-

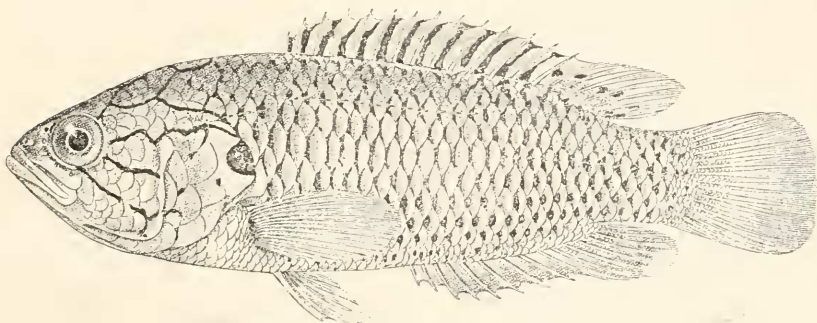


FIG. 158.—*Anabas vicinus*. Type.

orbital width; maxillary to below anterior third or centre of eye; palatine teeth present; none of the bones of the head serrated; operculum with a notch, between two more or less obtuse spines, 9 to 11 short gill-rakers on lower part of anterior arch. Dorsal xiii–xv 8–9; spines increasing in length to the eighth or ninth, which measures about $\frac{1}{4}$ length of head; longest soft rays $\frac{2}{5}$ to $\frac{1}{2}$ length of head. Anal viii–ix 8–9, similar to dorsal. Pectoral $\frac{3}{5}$ to $\frac{2}{3}$ length of head. Ventral not reaching anal. Caudal rounded. Caudal peduncle $1\frac{2}{3}$ to 2 times as deep as long, the distance between dorsal and caudal about $\frac{1}{4}$ length of head. Scales rugose, partly cycloid, partly ctenoid, 27–29 $\frac{3-4}{10-11}$; lateral lines $\frac{15-18}{+11}$. Brown above, lighter beneath, often spotted all over with black; blackish lines radiating from the eye; spinous dorsal with black markings; lobe between opercular spines black.

Total length 120 milli .

Port Elizabeth, Cape Colony.”

3. ANABAS BAINSI, Cast.

Sandelia bainsii, Casteln., Mém. Poiss. Afr. Austr., p. 37 (1861); Bouleng., Ann. and Mag. Nat. Hist. (7), iii, 1899, p. 243.

Ctenopoma microlepidotum, Günth., Cat. Fish., iii, p. 565 (1861).

Spirobranchus bainsii, Günth., Ann. and Mag. Nat. Hist. (4), xviii, 1876, p. 67.

Anabas bainsii, Bouleng., Ann. and Mag. Nat. Hist. (7), xvi, 1905, p. 53, and Freshw. Fish. Africa, iv, p. 52, fig. 29 (1916).

Teeth in a villiform band on jaws, those of the outer row enlarged; in a narrow band on vomer and palatines. Depth of body $2\frac{1}{5}$ times in total length excluding caudal, length of head $2\frac{3}{5}$ times. Snout obtusely conical, 4 times in length of head and equals interorbital space, which is flat; eye $4\frac{1}{5}$ times in length of head; preopercular margin entire, angle rounded; operculum terminates in 2 processes,

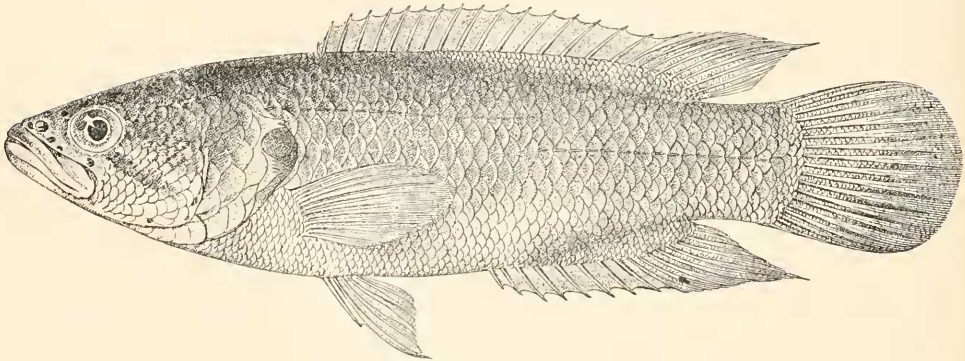


FIG. 159.—*Anabas bainsii*. $\frac{2}{3}$.

each of which is provided with 2 or more teeth, and which have a semicircular notch between them filled with a blackish membrane; serrature of suboperculum very indistinct, interopercle smooth; portion of gill-membranes covering isthmus scaly. Head covered with scales except on snout; scales on upper surface irregular, those on cheeks small, 8 series between orbit and margin of preoperculum; large open pores on head.

Dorsal xv 10; spines low, increasing in length to the last, which is nearly $\frac{1}{4}$ length of head; middle rays of soft dorsal and anal slightly produced and reaching beyond base of caudal. Pectoral rounded, a little more than $\frac{2}{5}$ length of head. Ventral $\frac{1}{2}$ length of head. Anal viii 9; spines increasing in length to the last, which

equals the longest spine of the dorsal. Caudal subtruncate, the angles rounded, rays slightly produced beyond the connecting membrane. Scales ciliated, those on the back smaller than those on the sides, $31\frac{7}{5}$; lateral lines $\frac{1}{5}$.

Colour (of preserved specimens), uniform dark brown, slightly darker above than below; one, or more, dark streaks from the eye towards the preopercular border.

One specimen, 94 mm. in length, from King Williams Town, Cape Province.

4. ANABAS MULTISPINIS, Peters.

Ctenopoma multispinis, Peters, Mon. Berl. Ac., 1844, p. 34, Müller's Arch. f. Anat. u. Phys., 1846, p. 481, pl. x, figs. 10-15, and Reise Mossamb., iv, p. 16, pl. ii, fig. 3 (1868).

? *Anabas scandens*, (non Daldorf), Bianconi, Spec. Zool. Mossamb., p. 270 (1858).

Spirobranchus smithii, Bianconi, op. cit., p. 279, pl. x (1859).

Ctenopoma multispine, Günth., Cat. Fish., iii, p. 373 (1861).

Anabas multispinis, Bouleng., Ann. and Mag. Nat. Hist. (7), xvi, 1905, pp. 53, 646, Trans. Zool. Soc., xviii, 1911, p. 408, and Freshw. Fish. Africa, p. 53, fig. 30 (1916).

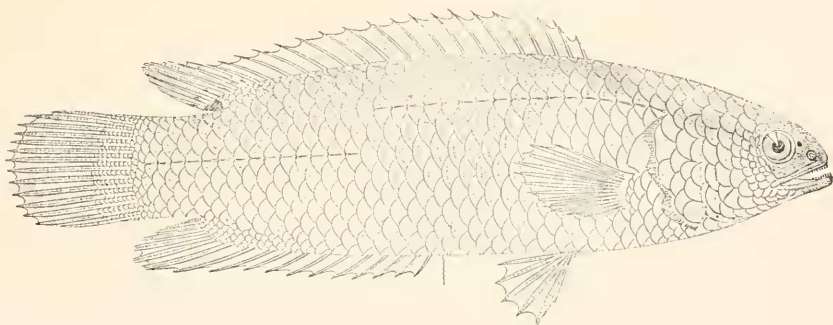


FIG. 160.--*Anabas multispinis*. Type, after Peters (Reise Mossamb.).

Teeth in a villiform band on jaws, those of the outer row slightly enlarged and curved; in a narrow band on vomer and palatines. Depth of body 3 to $3\frac{3}{4}$ times in total length excluding caudal, length of head 3 to a little more than 3 times. Snout obtusely conical, equals diameter of eye, which is $4\frac{1}{5}$ to $4\frac{2}{5}$ times in length of head; interorbital width 4 times in length of head; maxillary reaches to

below middle of eye, lower jaw prominent; preoperculum entire, angle rounded; operculum terminating in a semicircular notch posteriorly, with strong teeth on each corner, the denticulations decreasing in size as they approach the upper and lower margin of the opercle; sub- and inter-operculum strongly denticulated; 6 series of scales between orbit and preopercular angle. (In two of the specimens 2 rows of postorbital scales are strongly denticulated).

Dorsal xvi-xix 8-9; spines low, increasing in length to the last, which is $3\frac{3}{10}$ to $\frac{3}{5}$ length of head; middle soft rays of dorsal and anal slightly produced, $\frac{1}{2}$ to $\frac{3}{5}$ length of head, reaching beyond base of caudal. Pectoral $\frac{1}{2}$ to $\frac{3}{5}$ length of head, longer than ventral. Anal viii-ix 8-10, similar to dorsal. Caudal subtruncate; caudal peduncle much deeper than long. Scales strongly pectinate, 30-31 $\frac{2\frac{1}{2}-3}{8\frac{1}{2}-9}$; lateral lines $\frac{16-18}{13-15}$.

Colour (of preserved specimens), dark brown above, yellowish beneath; indistinct dark spots on body.

Three specimens, ranging from 63-71 mm. in length, from Umsifu River, Broken Hill, Rhodesia (collected by Rogers and Chubb). Bulawayo Museum.

Three specimens, ranging from 53-64 mm. in length, from Sawmills, Bulawayo, Rhodesia (Mr. F. D. McKean).

5. ANABAS RHODESIANUS, n. sp.

Teeth in a band on each jaw, those of the outer series fewer in number, stronger, conical; in a narrow band on vomer and palatines. Depth of body 4 times in total length excluding caudal, length of head $3\frac{1}{2}$ times. Body compressed and comparatively slender; snout obtusely conical, nearly 6 times in length of head, eye $5\frac{2}{3}$ times, inter-orbital width $3\frac{1}{5}$ times; lower jaw projecting beyond upper, chin prominent; maxillary extends to below posterior margin of eye; preoperculum entire, angle rounded; operculum strongly denticulated, terminating in a semicircular notch, which has the teeth at each corner stronger and longer than the others, which become smaller as they approach the upper and lower borders of the opercle; sub- and inter-operculum strongly denticulated; 6 series of scales between the orbit and the preopercular angle. Head and cheeks scaly. Gill-membranes covering isthmus scaly.

Dorsal xviii 10; spines subequal from the 6th, which is $\frac{1}{4}$ length of head; middle soft rays a little produced, nearly $\frac{3}{5}$ length of head. pectoral $\frac{7}{10}$ length of head. Anal ix 9; longest spine slightly longer

than longest dorsal spine, soft portion of fin similar to soft dorsal. Caudal rounded; caudal peduncle $1\frac{1}{2}$ times as deep as long. Scales etenoid, $31\frac{3}{9}$; lateral lines $\frac{1}{3}$.

Colour (of preserved specimen), dark uniform brown, scales on upper two-thirds of body and head blackish in the centre.

One specimen, 126 mm. in length, from Livingstone, Rhodesia (Mr. A. Stephenson).

SUB-ORDER OPISTHOMI.

FAMILY MASTACEMBELIDAE.

MASTACEMBELUS.

Gronov., Zoophyl., p. 133 (1781), part.; Günth., Cat. Fish., iii, p. 540 (1861); Bouleng., Poiss. Bass. Congo, p. 490 (1901), Fish. Nile, p. 540 (1907), Journ. Ac. Philad. (2), xv, 1912, p. 197, and Freshw. Fish. Africa, iv, p. 112 (1916).

“Rostral appendage not striated inferiorly. Dorsal with 7 to 39 spines, anal with 1 to 3.

South-eastern Asia, China, Euphrates, Oxus, and Tropical Africa.

In all the African species the caudal fin is confluent with the dorsal and anal.”

MASTACEMBELUS MELLANDI, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (8), iv, 1914, p. 386, and Freshw. Fish. Africa, iv, p. 135, fig. 89 (1916).

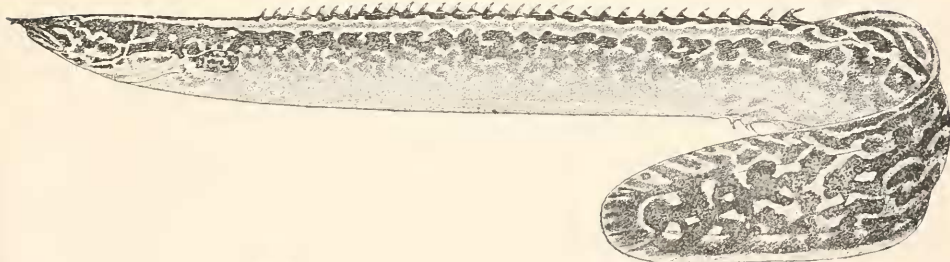


FIG. 161.—*Mastacembelus mellandi*. Type. $\frac{1}{2}$.

Depth of body 12 times in total length, length of head 8 times. Vent nearly equally distant from head and from caudal, its distance

from former $3\frac{1}{2}$ times its length. Snout 4 times as long as eye, ending in an appendage which is $1\frac{1}{2}$ times as long as eye; mouth extending to below anterior border of eye; no preorbital or preopercular spines.

Dorsal xxxii 70; last spine twice as long as eye; distance between first spine and head $\frac{1}{2}$ length of latter. Anal ii 75; first spine short, second as long as last dorsal. Caudal rounded. Pectoral $\frac{1}{3}$ length of head. Scales very small, 15 between origin of soft dorsal and lateral line.

Yellowish-brown with blackish-brown marblings, and a broad festooned, blackish-brown lateral band in front; a vertebral series of large blackish-brown spots narrowly separated from each other; a pair of yellowish streaks, confluent in front, on each side of the back between the dark bands; caudal region blackish brown with a network of yellow lines; lower edge of anal yellow.

One specimen, 240 mm. in length, from Sipapoma, South Rhodesia (Rev. Ellenberger). Bulawayo Museum.

It is also reported from Northern Rhodesia.

ADDENDA.

Page 331. After *Gnathonemus macrolepidotus* insert:

*GNATHONEMUS ANGOLENSIS, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (7). xv, 1905, p. 458, and Freshw.

Fish. Africa, i, p. 109, fig. 89 (1909), and iv, p. 165 (1915);

Pellegr., Bull. Soc. Zool. France, xxxix, 1914, p. 24.

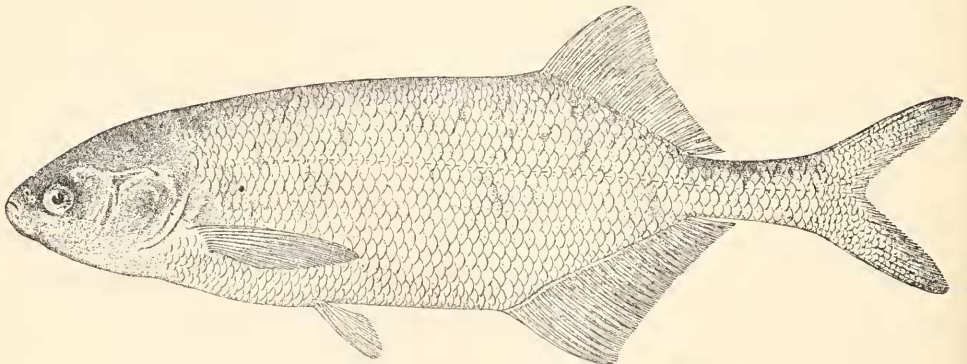


FIG. 162.—*Gnathonemus angolensis*. Type.

“Depth of body $3\frac{1}{4}$ to $3\frac{1}{2}$ times in total length, length of head $4\frac{1}{3}$ to 5 times. Head as long as deep, with curved upper profile; snout

$\frac{1}{4}$ length of head; teeth conical, 5 in upper jaw, 6 in lower; a feeble mental swelling; eye moderate, a little shorter than snout, $\frac{2}{3}$ interorbital width. Dorsal 24–26, originating above 6th to 8th ray of anal, its length $2\frac{1}{3}$ to $2\frac{1}{2}$ times in its distance from head. Anal 29–33, nearer base of caudal than base of ventral. Pectoral pointed, a little shorter than head, twice as long as ventral, extending a little beyond base of latter. Caudal scaled in its basal two-thirds, with pointed lobes. Caudal peduncle $2\frac{1}{2}$ times as long as deep, $\frac{3}{4}$ length of head. 56–60 scales in lateral line, $\frac{10}{16}$ – $\frac{12}{18}$ in transverse series on body, $\frac{8-10}{8-13}$ in transverse series between dorsal and anal, 12 round caudal peduncle. Brown above, silvery white beneath; a few irregular dark brown blotches may be present on the body; fins dark brown.

Total length 135 mm.

Angola. Recorded from Upper Zambesi by Pellegrin."

Page 332. After *Mormyrus anchietae*, Guim., insert:

*MORMYRUS ELLENBERGERI, Pellegr.

Pellegr., Bull. Zool. Soc. France, xxxix, 1914, p. 24; Bouleng., Freshw. Fish. Africa, iv, p. 167 (1916).

"Depth of body $4\frac{1}{4}$ to $4\frac{1}{3}$ times in total length, length of head 4 times. Head $1\frac{1}{2}$ times as long as deep, with curved upper profile; snout scarcely bent downwards, its length little more than $\frac{1}{2}$ postocular part of head; chin slightly swollen. Teeth notched, 7 or 8 in upper jaw, 11 in lower; eye moderate, its diameter $2\frac{1}{4}$ times in length of snout, twice in interorbital width. Dorsal 62–68, originating well in advance of ventral, $4\frac{1}{4}$ to $4\frac{1}{2}$ times as long as deep. Anal 18–19, originating nearer base of caudal than base of pectoral. Pectoral rounded, a little more than $\frac{1}{2}$ length of head, 3 times length of ventral. Caudal scaled at the base, with obtusely pointed lobes. Caudal peduncle $1\frac{1}{2}$ times as long as deep. 90–92 scales in lateral line, $\frac{15}{20-22}$ in transverse series on body, $\frac{1}{1}$ – $\frac{3}{3}$ in transverse series between dorsal and anal, 18 round caudal peduncle.

Brownish with silvery sheen; fins dark.

Total length 153 millim.

Upper Zambesi—types in Paris Museum.

Distinguished from *M. anchietae* by the less bent snout, more scales in the lateral line, and fewer round the caudal peduncle."

MORMYRUS LONGIROSTRIS, Peters.

Mormyrus longirostris, Peters, Mon. Berl. Ac., 1852, p. 275, and Reise Mossamb., iv, p. 83, pl. xvi, fig. 2 (1868); Günth., Cat. Fish., vi, p. 216 (1866); Bouleng., Trans. Zool. Soc., xvii, 1906, p. 546, and Freshw. Fish. Africa, i, p. 139, fig. 115 (1909); Pappenh. Mitth. Zool. Mus. Berl. iii, 1907, p. 362.

Mormyrus mucupe, Peters, tt. cc., pp. 275, 87, pl. xvi, fig. 1; Günth. t. c., p. 215.

Mormyrus longirostris, part., Bouleng., Proc. Zool. Soc., 1908, p. 817, and Poiss. Bass. Congo, p. 112 (1901).

Teeth notched (mouth damaged in specimen: about 5 to 7 teeth on upper jaw, 8 to 12 on lower). Depth of body $3\frac{2}{3}$ times in total length excluding caudal, length of head $3\frac{2}{3}$ times. Head $1\frac{2}{3}$ times as long as deep, with slightly curved upper profile; snout produced, as long as postocular part of head, its length $2\frac{3}{5}$ times its least depth; mouth very small, lower jaw feebly projecting; eye moderate, its diameter $2\frac{1}{3}$ times in interorbital width, 12 times in length of head.

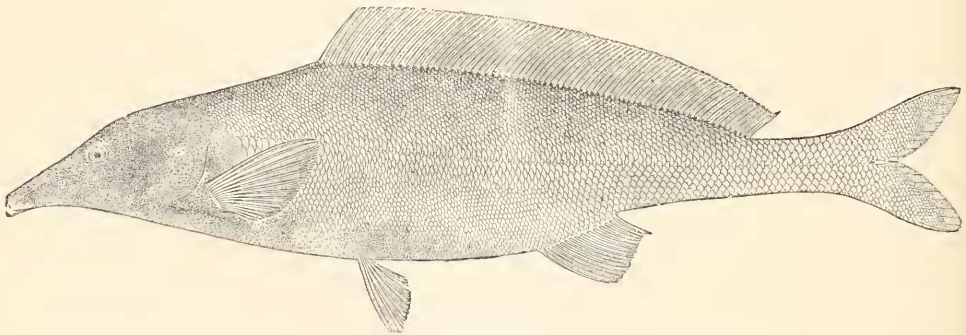


FIG. 163.—*Mormyrus longirostris*.

Dorsal 65, originating in advance of ventral, $4\frac{3}{5}$ times as long as anal, $1\frac{1}{5}$ times as long as its distance from end of snout. Pectoral obtusely pointed, nearly $\frac{2}{3}$ length of head. Ventral $\frac{2}{5}$ length of head. Anal 17, originating a little nearer to base of caudal than to base of pectoral. Caudal densely scaled, with rounded lobes; caudal peduncle $1\frac{1}{2}$ times as long as deep. About 95 scales in lateral line, $\frac{2}{3}\frac{2}{3}$ in transverse series on body, 40 in transverse series between dorsal and anal, 22 round caudal peduncle.

Colour (of preserved specimen) pale reddish yellow, lighter below throat.

One specimen, 268 mm. in length, from Umgusa River, Southern Rhodesia (Mr. C. Baker). Bulawayo Museum.

This species is also reported from the Zambesi and Lakes Nyassa, Mweru and Tanganyika.

Page 348. After *L. seeberi*, Gilchr. and Thomp., insert :

LABEO HAMILTONI, n. sp.

Body compressed, its depth $3\frac{2}{3}$ to $3\frac{1}{2}$ times in total length excluding caudal, length of head 4 to $4\frac{2}{3}$ times. Head $1\frac{2}{3}$ to $1\frac{1}{3}$ times as long as broad, depressed; snout prominent, with a deep transverse groove, about equal to or slightly longer than postocular portion of head and $2\frac{1}{2}$ to $2\frac{2}{3}$ times in length of head; eye lateral, in middle of head, $3\frac{2}{3}$ to $4\frac{1}{2}$ times in length of head, $1\frac{1}{2}$ to 2 times in interorbital width; width of mouth, with lips, about $\frac{1}{2}$ width of head; lips moderately developed, fringed with long conical papillae, with a band of small plicae on inner surface and with a smooth, cutting inner edge; rostral flap entire; snout covered with strong tubercles or their pits or scars. A small barbel on each side, $\frac{1}{4}$ to nearly $\frac{1}{2}$ diameter of eye in length.

Dorsal iii 11; about equidistant between middle of eye and base of caudal, upper edge concave, longest rays $1\frac{1}{10}$ to $1\frac{1}{7}$ times length of head. Pectoral $\frac{4}{5}$ length of head, not reaching ventral, which is inserted below anterior half of dorsal. Anal ii 5, not reaching caudal, which is deeply forked, crescentic, and $1\frac{1}{4}$ to $1\frac{2}{3}$ times in length of head. Caudal peduncle $1\frac{1}{5}$ to $1\frac{3}{10}$ times as long as deep. Scales 38-40 $\frac{6\frac{1}{2}}{6\frac{1}{2}}$, $4\frac{1}{2}$ between lateral line and base of ventral, 20 round caudal peduncle.

Colour (of preserved specimens) golden brown, darker above, silvery below; scales dark on outer edges, forming longitudinal lines between the several series; vertical fins greyish, covered with minute dark specks.

Three specimens, 98 mm., 124 mm., 132 mm. in length respectively, from Sabi River Game Reserve, Transvaal (Major J. Stevenson Hamilton).

This species closely resembles *L. cyclorhynchus*.

Page 421. After *Barbus lineomaculatus*, Blgr., insert :

**BARBUS BARILIOIDES*, Blgr.

Bouleng., Ann. and Mag. Nat. Hist. (8), xiv, 1914, p. 386, and Freshw. Fish. Africa, iv, p. 266, fig. 164 (1916).

“Depth of body equal to length of head, $3\frac{2}{3}$ times in total length. Snout rounded, shorter than eye, which is 3 times in length of head and equals interorbital width; mouth small, terminal; lips feebly developed; two barbels on each side, anterior as long as eye, posterior $1\frac{1}{2}$ diameters of eye.

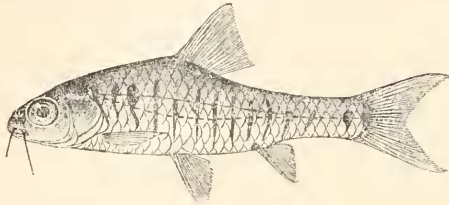


FIG. 164.—*Barbus barilioides*. Type.

Dorsal iii 8; equally distant from centre of eye and from caudal, border straight; last simple ray not enlarged, not serrated, nearly as long as head. Anal iii 5; not reaching caudal. Pectoral $\frac{3}{4}$ length of head, not quite reaching ventral; base of latter below anterior rays of dorsal. Caudal peduncle twice as long as deep. Scales radiately striated, 28–30 $\frac{4\frac{1}{2}}{4\frac{1}{2}}$, 2 between lateral line and ventral.

Yellowish brown, darker on the back, with 12 to 16 narrow vertical bars on the sides, the second or third and the last expanding into a spot; belly white; basal half of vertical fins orange; eye red.

Total length 53 millim.

Solwezi River, tributary of Chifulowa River; Zambesi.”

From Northern Rhodesia. “Distinguished from *B. fasciolatus* by smaller scales.”

Page 421. Before *B. viviparus*, M. Web., insert :

BARBUS ANNECTENS, n. sp.

Depth of body $3\frac{3}{4}$ times in total length excluding caudal, length of head 4 times. Snout rounded, longer than eye, which is $3\frac{1}{3}$ times in length of head; interorbital width 3 times in length of head; mouth terminal, its width $3\frac{1}{7}$ times in length of head, lips moderate. Two barbels on each side, anterior a little longer than eye, posterior $\frac{3}{4}$ eye.

Dorsal iii 7; border feebly concave, equally distant from anterior

border of eye and from root of caudal; last simple ray flexible, not enlarged, not serrated, slightly longer than head. Anal iii 5; not reaching caudal. Pectoral $\frac{7}{10}$ length of head, not reaching ventral; base of later inserted below anterior rays of dorsal. Caudal (broken in specimen); caudal peduncle $1\frac{2}{3}$ times as long as deep. Scales radiately striated, $28\frac{31}{3}$; 2 between lateral line and base of ventral; 12 round caudal peduncle.

Colour (of preserved specimen) pale brown, silvery below; scales on back and upper part of body with minute dark specks; 5 more or less distinct dark spots on the side, the first 4, rather small and indistinct, situated between the verticals of the axil of pectoral fin and posterior margin of dorsal, the last spot situated on base of caudal; a dark lateral band traverses all these spots, fainter and above the lateral line on the fore part of the body, but on the lateral line at the 1st and 2 last spots.

One specimen, 45 mm. in length, from Sabi River, Transvaal (Major J. Stevenson Hamilton).

This species closely resembles *B. lineomaculatus* and *B. weneri*.

Page 431. After *Barbus rogersi*, Blgr., insert:

* BARBUS TOPPINI, Blgr.

Bouleng., Freshw. Fish. Africa, iv, p. 274 (1916).

“Depth of body equal to or a little greater than length of head, $3\frac{1}{2}$ to $3\frac{3}{4}$ times in total length. Snout rounded, shorter than eye, which is $3\frac{1}{3}$ to $3\frac{1}{2}$ times in length of head and equals interorbital width; mouth small, terminal; lips feebly developed; no barbels.

Dorsal iii 8; equally distant from eye and from caudal, border feebly concave; last simple ray not enlarged, not serrated, nearly as long as head. Anal iii 5; not reaching caudal. Pectoral a little shorter than head, not reaching ventral; base of latter below anterior rays of dorsal. Caudal peduncle twice as long as deep. Scales radiately striated, 27–28 $\frac{4\frac{1}{2}-5\frac{1}{2}}{2\frac{1}{2}-3\frac{1}{2}}$, $1\frac{1}{2}$ between lateral line series and ventral; lateral line reduced to 3 to 7 anterior tubules.

Yellowish, with a black lateral line expanding into a small spot at the base of the caudal fin.

Total length 30 millim.

Zululand. Types in Durban Museum.

. . . Msundusi R., Ubombo district . . .

Distinguished from the species without barbels and with incomplete lateral line by the more numerous scales.”

Page 437. In synopsis of genera, family *Siluridae*, insert after *Heterobranchus* :

Sides of head naked, only the postorbital shield being present ; adipose dorsal, fin small *Dinotopterus*.

Page 448. After *Heterobranchus longifilis* insert :

DINOPTERUS.

Bouleng. Trans. Zool. Soc., xvii, 1906, p. 550 ; Proc. Zool. Soc., 1907, p. 1097 ; and Freshw. Fish. Africa, ii, p. 276 (1911).

“As in the preceding, but sides of head naked, only the postorbital shield being present, and dorsal fin small, not supported by bony rays.” *Blyr.*

DINOPTERUS JALLAE, n. sp.

Teeth minute, in a narrow band on upper jaw ; in a broader crescentic band, wide in the centre and narrowing to a point on each side

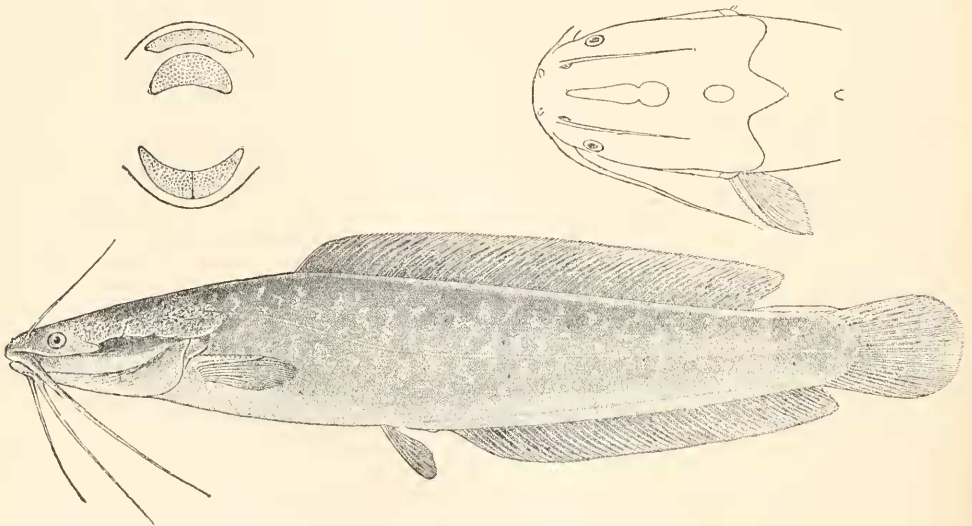


FIG. 165.—*Dinotopterus jallae*. Type.

on lower jaw ; in a broad curved band on vomer. Depth of body $5\frac{2}{3}$ times in total length excluding caudal, length of head $3\frac{1}{3}$ times. Head flattened, $1\frac{2}{3}$ times as long as broad, its upper surface covered

with a thin skin and feebly rugose; frontal fontinelle large, 4 times as long as broad, nearly $\frac{2}{3}$ length of head, sole-shaped; occipital fontinelle small; occipital process angular, broader than long; snout broad, truncate, not projecting beyond mouth; eye small, $3\frac{3}{5}$ times in length of snout, 5 times in interorbital width; nasal barbel a little more than $\frac{1}{2}$ length of head; maxillary barbel $\frac{9}{10}$ length of head, reaching to posterior third of pectoral; outer mandibular barbels $1\frac{2}{5}$ times as long as inner, $\frac{3}{4}$ length of head. Gill-rakers long, slender, closely set, and very numerous.

Dorsal 58, its distance from occipital process $\frac{1}{5}$ length of head, posterior margin rounded; adipose dorsal minute, very low, short, and in contact with caudal. Pectoral $\frac{2}{3}$ length of head; spine strong, serrated, $\frac{2}{3}$ length of soft rays. Ventral a little nearer to snout than to base of caudal. Anal 53, separated from caudal by a space equal to diameter of eye. Caudal rounded.

Colour (of preserved specimen) dark olive-brown, marbled with whitish markings above, white beneath; or more or less distinct dark streak on lower surface of head.

One specimen, 220 mm. in length, from Shesheke. Southern Rhodesia (Rev. L. Jalla).

Page 454 After *Gephyroglanis sclateri*, Blgr., insert:

AMPHILIUS.

Pimelodus, part., Günth., Cat. Fish., v, p. 114 (1864).

Amphilius, Günth., t.c., p. 115; Poche, Zool. Anz., 1902, pp. 121 and 212; Bouleng., Freshw. Fish. Africa, ii, p. 353 (1911), and iv, p. 306 (1916).

Anoplopterus, Pfeff. Jahrb. Hamb. Wiss. Anst., vi, 2, 1889, p. 15. and Thierw. O.-Afr., Fische, p. 33 (1896); Bouleng., Ann. and Mag. Nat. Hist. (7), i, 1898, p. 255, and Ann. Mus. Congo. Zool., ii, p. 41 (1902).

Chimarrhoglanis, Vaill., Bull. Mus. Paris, 1897, p. 81.

"Body more or less elongate, more or less depressed anteriorly. Dorsal and anal fins short, the former consisting of a soft simple ray and 5 to 7 branched rays; an adipose dorsal fin. Pectoral fin expanded horizontally, the outer ray more or less thickened but not ossified, formed of very numerous angularly bent articles, bearing an outer series or fringe of hair-like rays. Ventral fin with 6 rays, the outer of which is similar to the outer pectoral. Three pairs of barbels; maxillary and two mandibulars. Nostrils widely separated from each other. Eye superior, without free border. Maxillary bone rather

large, hidden in the lip but bordering the mouth; jaws with a band of villiform teeth; no teeth on the palate. Gill-membranes free, deeply notched. Air-bladder absent.

Vertebrae 41 (19 — 20 × 20 — 21). Eight or 9 branchiostegal rays. A more or less distinct foramen above the axil.

Tropical Africa."

AMPHILIUS LONGIROSTRIS, Blgr.

Anoplopterus longirostris, Bouleng., Ann. and Mag. Nat. Hist. (7), viii, 1901, p. 447.

Amphilius longirostris, Bouleng., Proc. Zool. Soc., 1903, i, p. 25, pl. i, fig. 3, and 1905, i, p. 64, and Freshw. Fish. Africa, ii, p. 359, fig. 279 (1911), and iv, p. 308 (1916).

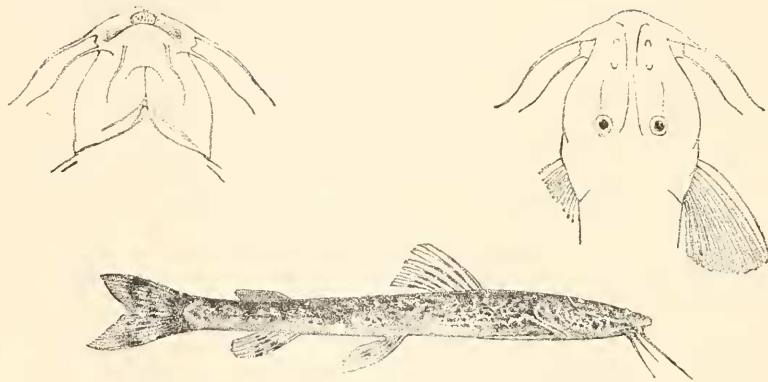


FIG. 166.—*Amphilius longirostris*. Type (P.Z.S., 1903).

Teeth in a villiform band. Depth of body $6\frac{3}{7}$ to 9 times in total length excluding caudal, length of head 4 to $4\frac{1}{2}$ times. Head much depressed, $1\frac{1}{10}$ to $1\frac{3}{10}$ times as long as broad; snout obtusely pointed, about $\frac{1}{2}$ length of head; eye very small, in second half of head, $6\frac{1}{5}$ to 8 times in length of head, 2 to $2\frac{1}{2}$ times in interocular width; posterior nostril midway between eye and end of snout; maxillary barbel $\frac{2}{3}$ to nearly the same length as head, reaching root of pectoral or beyond; outer mandibular barbel $\frac{2}{3}$ to $\frac{7}{10}$ length of head, inner about $\frac{2}{5}$. Gill-rakers moderate, 5 or 6 on lower part of anterior arch.

Dorsal i 6; much nearer to end of snout than to root of caudal; adipose dorsal low, $1\frac{1}{2}$ times to twice as long as rayed dorsal, and $\frac{1}{2}$ to as long as its distance from the latter. Pectoral $\frac{7}{10}$ to as long as head. Ventral a little shorter than pectoral, well behind base of dorsal.

Anal ii 7; caudal emarginate; caudal peduncle a little longer than deep.

Colour (of preserved specimens) dark olive-brown above, with darker spots and marblings, pale yellowish beneath, sometimes with more or less distinct large transverse yellowish spots on back; fins light, with dark transverse streaks or spots; caudal black at the base, with a large blackish blotch on each lobe.

Three specimens, 25 mm., 45 mm., 80 mm. in length respectively, from Zululand (Mr. H. W. Bell-Marley).

Our specimens differ in some minor respects from the species described as *A. longirostris* by Boulenger, but this is probably owing to their small size.

The species has been described from South Cameroon.

[Since this was in type we have learned that Boulenger has received specimens from Krantzklouf, Natal, representing a new species which he calls *Amphilius natalensis*. It is doubtful that these specimens should prove to be specifically identical with those we describe under the name of *Amphilius longirostris*, the differences being very considerable.]

Page 463. After *Synodontis macrostigma*, Blgr., insert :

*SYNODONTIS LEOPARDINUS, Pellegr.

Pellegr., Bull. Soc. Zool. France, xxxix, 1914, p. 25; Bouleng., Freshw. Fish. Africa, iv, p. 320 (1916).

Depth of body $3\frac{3}{4}$ times in total length, length of head a little more than 3 times. Head $1\frac{1}{3}$ times as long as broad, granulate above; snout rounded, considerably longer than postocular part of head; eye supero-lateral, $7\frac{1}{2}$ times in length of head, $2\frac{1}{2}$ times in interorbital width; lips moderately developed; premaxillary teeth forming a rather broad band, in six transverse series; movable mandibular teeth $\frac{2}{5}$ diameter of eye, 21 in number. Maxillary barbel feebly margined at base, $\frac{2}{3}$ length of head, not reaching base of pectoral; mandibular barbels strongly branched, outer $1\frac{1}{2}$ times as long as inner. Gill-opening not extending downwards beyond base of pectoral spine. Occipito-nuchal shield granulate like the occiput, scarcely longer than broad, posterior processes pointed. Humeral process granulate, a little longer than broad, obtusely pointed, extending nearly as far back as occipito-nuchal process. Dorsal i 7; spine a little longer than head, not striated, smooth in front, feebly serrated behind. Adipose dorsal $3\frac{2}{3}$ times as long as deep, as long as its distance from rayed

dorsal. Anal iv 8; rounded. Pectoral spine $\frac{3}{4}$ length of dorsal, finely denticulated on outer border, strongly serrated on inner. Ventral not reaching anal. Caudal forked, upper lobe the longer. Caudal peduncle $1\frac{1}{2}$ times as long as deep.

Yellowish, with numerous round black spots, the largest, on the side of the body, hardly as large as the eye; all the fins also spotted with black.

Total length 160 millim.

Upper Zambesi, Northern Rhodesia. Type in Paris Museum."

SYNODONTIS MELANOSTICTUS, Blgr.

Synodontis melanostictus, Bouleng., Trans. Zool. Soc., xvii, 1906, p. 553, pl. xxxiv, and Freshw. Fish. Africa, ii, p. 418, fig. 314 (1911), and iv, p. 316 (1916).

Synodontis melanostictus, var. *iturii*, Steindr. Anz. Ak. Wien, 1911, p. 316.

Premaxillary teeth forming a short broad band, movable mandibular teeth about $\frac{1}{2}$ diameter of eye in length, about 30 in number. Depth of body about 4 to $4\frac{2}{3}$ times in total length excluding caudal, length of head $3\frac{7}{10}$ to 4 times. Head a little longer than broad, rugose above. Snout rounded, a little more than twice in head, $1\frac{1}{5}$ to $1\frac{1}{2}$ times in postocular part of head; eye $5\frac{3}{4}$ to $6\frac{1}{4}$ times in length of head, $2\frac{1}{3}$ to $2\frac{3}{5}$ times in interorbital width; width of mouth about $\frac{1}{2}$ length of head; maxillary barbel $1\frac{1}{7}$ to $1\frac{1}{5}$ times length of head, with a narrow membrane at base, and reaching to about middle of pectoral spine; outer mandibular barbel $\frac{1}{5}$ length of head, inner $\frac{1}{2}$ to $\frac{3}{5}$ as long as outer, both with long slender branches without ramifications; lips moderately developed. Gill-opening not extending downwards beyond root of pectoral spine. Occipito-nuchal shield rough like occiput, obtusely tectiform, $1\frac{1}{5}$ as long as broad, with rounded or truncate posterior processes; humeral process $1\frac{7}{10}$ to nearly twice as long as broad, indistinctly keeled, sharp pointed, extending as far as or not quite so far back as occipito-nuchal process.

Dorsal i 7; spine as long as head, striated, curved, front edge sharp, feebly serrated behind. Adipose dorsal 4 to $4\frac{1}{5}$ times as long as deep, $1\frac{3}{5}$ to twice as long as its distance from rayed dorsal. Pectoral spine $\frac{9}{10}$ to slightly longer than head, not reaching ventral, strongly serrated on both sides. Ventral not reaching to anal. Anal iv 7-8, obtusely pointed in front. Caudal deeply forked, upper lobe longer than lower; caudal peduncle as long as deep.

Colour (of preserved specimens) dark brown; body and fins covered with small round black spots, those on throat and anterior part of belly slightly smaller than the rest.

One specimen, 183 mm. in length, from Lialui, Barotseland, Upper Zambesi.

One specimen, 166 mm. in length, from Lake Ngami.

This species is also reported from Lakes Tanganyika, Bangwelu and Mweru.

SYNODONTIS JALLAE, n. sp.

Premaxillary teeth forming a short broad band; movable mandibular teeth about $\frac{1}{3}$ diameter of eye in length, 16 in number. Depth of body 4 times in total length excluding caudal, length of head $3\frac{2}{3}$ times. Head $1\frac{1}{3}$ as long as broad, strongly rugose above from a little in advance of eyes; snout obtusely pointed, about $\frac{1}{2}$ length of head, a little longer than postocular part of head; eye supero-lateral, $6\frac{3}{5}$ times in length of head, a little more than $2\frac{4}{5}$ times in interorbital width; width of mouth about $\frac{1}{2}$ width of head; maxillary barbel $\frac{7}{10}$ length of head, with a narrow marginary membrane at base, not reaching base of pectoral spine; outer mandibular barbel about $\frac{2}{5}$ length of head and $1\frac{1}{2}$ times as long as inner, both of them with short tubercular branches; lips moderately developed. Gill-openings not extending downwards beyond root of pectoral spine. Occipito-nuchal shield very rough like occiput, obtusely tectiform, nearly twice as long as broad, with rounded posterior processes. Humeral process broad, obtusely pointed, upper border curved, longer than broad, granulate, indistinctly keeled, extending about as far back as occipito-nuchal process.

Dorsal i 7; spine $1\frac{1}{10}$ times as long as head, feebly curved, striated, smooth in front and feebly serrated behind in its upper part. Adipose dorsal $4\frac{2}{3}$ times as long as deep, $1\frac{3}{10}$ times as long as its distance from rayed dorsal. Pectoral spine a little more than $\frac{4}{5}$ length of head, not reaching ventral, finely serrated on its outer border and strongly on inner. Ventral not reaching anal. Anal iv 7. Caudal deeply forked, upper lobe the longer; caudal peduncle $1\frac{2}{5}$ times as long as deep.

Colour (of preserved specimen) dark olive-brown above, lighter below; body, fin-membranes and head covered with small dark spots, which become mere specks on belly, throat and head.

One specimen, 170 mm. in length, from Shesheke, S. Rhodesia (Rev. Jalla).

This species closely resembles *S. melanostictus*, but there are fewer mandibular teeth, the mandibular barbels are tuberculous, the humeral process is broader and differently shaped and the spots, especially anteriorly are much smaller.

Since the publication of the first part of this monograph specimens have been received which extend or supplement the distribution of the following species. [EDITOR.]

- P. 325. *Petrocephalus catostoma* Günth. Lialui, Barotseland, N. Rhodesia (Rev. v. Ellenberger).
- P. 330. *Gnathonemus macrolepidotus* Peters. Gwanda, Rhodesia (Bulawayo Museum); Magoye, Rhodesia (D. C. Thwaites); Lialui, Barotseland (Rev. Ellenberger); Lake N'gami (H. F. Kirkham).
- P. 331. *Mormyrus anchietæ* Guim. Magoye, Rhodesia (D. C. Thwaites).
- P. 338. *Hydrocyon lineatus* Blkr. Lialui, Barotseland (Rev. Ellenberger); Lake N'gami (H. F. Kirkham).
- P. 336. *Sarcodaces odœ* Bl. Lake N'gami (H. F. Kirkham).
- P. 342. *Micralstes acutidens* Peters. Victoria Falls, Rhodesia (Bulawayo Museum).
- P. 350. *Labeo cylindricus* Peters. Victoria Falls, Rhodesia (Bulawayo Museum).
- P. 348. *Labeo forskalii* Rüpp. Sawmills, Bulawayo (F. D. McKean).
- P. 356. *Labeo ruddi* Blgr. Sabi River, Transvaal (J. S. Hamilton).
- P. 358. *Labeo altivelis* Peters. Sawmills, Bulawayo (F. D. McKean).
- P. 374. *Barbus holubi* Stdr. Great Fish River, near Gibeon, S.W. Afr. (R. W. E. Tucker); M'fongosi, Zululand (W. E. Jones).
- P. 380. *Barbus sector* Blgr. Sabi River, Transvaal (J. S. Hamilton).
- P. 387. *Barbus aureus* Cope. M'fongosi, Zululand (W. E. Jones).

- P. 401. *Barbus trimaculatus* Peters. Norquane River, Rhodesia (Bulawayo Museum); Umfolozi River and Inyalazi River, Natal (H. W. Bell-Marley); Kuruman. One of the specimens from the Inyalazi River reaches a length of 150 mm.
- P. 404. *Barbus paludinosus* Peters. Lialui, Barotseland (Rev. Ellenberger).
- P. 407. *Barbus longicauda* Blgr. Norquane River, Rhodesia (Bulawayo Museum).
- P. 414. *Barbus serrula* G. and T. Umgusa River, Rhodesia (Bulawayo Museum).
- P. 420. *Barbus lineomaculatus* Blgr. Sawmills, Bulawayo (F. D. McKean).
- P. 428. *Barbus anoplus* M. Web. Lake Chrissie, Transvaal (J. Drury).
- P. 434. *Barilius stephensoni* G. and T. Sabi River, Transvaal (J. S. Hamilton).
- P. 436. *Engraulicypris brevianalis* Blgr. Sabi River, Transvaal (J. S. Hamilton).
- P. 439. *Clarias gariepinus* Burch. Lake N'gami (H. F. Kirkham) Magoye, Rhodesia (D. C. Thwaites).
- P. 443. *Clarias ngamensis* Cast. Kafue R. Zambezi (J. G. Hotchkiss).
- P. 449. *Plotosus anguillaris* Bl. East London (H. E. Brooking).
- P. 451. *Schilbe mystus* L. Lialui, Barotseland (Rev. Ellenberger).
- P. 458. *Synodontis zambezensis* Peters. Sawmills, Bulawayo (F. D. McKean).

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